

ENS254 Earth Observation: Remote Sensing and Surveying

School: School of Science, Technology and Engineering

2024 Semester 2

UniSC Sunshine Coast
UniSC Moreton Bay

**BLENDED
LEARNING**

Most of your course is on campus but you may be able to do some components of this course online.

Please go to usc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

In this course you will learn theoretical, applied & practical aspects of modern & conventional geospatial techniques necessary for observing and analysing earth resources. You will acquire a combination of high-tech & low-tech geospatial skills that will include satellite image analysis, digital map creation, and surveying. In addition to performing GIS and image analysis, you will use instruments such as compass, theodolite, GNSS (GPS). Finally, you will integrate data-sets collected using various techniques in GIS to compare their suitability for different situations.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous learning materials	2hrs	Week 1	13 times
Laboratory 1 – Tutorials in computer labs and on-campus fieldwork.	2hrs	Week 1	13 times

1.3. Course Topics

Remote Sensing and Image Interpretation:

- Electro-magnetic spectrum and sensor types
- Analogue and digital image interpretation
- Image analysis (classification and change detection)
- Image analysis (enhancements)
- Remote sensing applications to a variety of areas

Ground truthing for satellite image using surveying methods:

- Surveying Techniques
- Using theodolite, compass and range finders
- Data collection and analysis

Global navigation satellite systems (GNSS):

- GNSS fundamentals
- Global positioning system (GPS) and GLONASS
- Differential GNSS
- GNSS accuracy

Data collection and analysis:

- Integration of satellite images and other geographic data collected through surveying and GNSS in a GIS
- Visualisation through a cartographic map
- Data Analysis and Synthesis

2. What level is this course?

200 Level (Developing)

Building on and expanding the scope of introductory knowledge and skills, developing breadth or depth and applying knowledge and skills in a new context. May require pre-requisites where discipline specific introductory knowledge or skills is necessary. Normally, undertaken in the second or third full-time year of an undergraduate programs.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...
1 Describe, explain and assess geospatial techniques and concepts.	Knowledgeable
2 Select and apply geospatial tools and skills to address a real-world issue	Empowered
3 Evaluate and justify the use of different primary earth observation datasets for different applications.	Empowered
4 Demonstrate critical spatial thinking	Creative and critical thinker

5. Am I eligible to enrol in this course?

Refer to the [UniSC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

Not applicable

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Basic knowledge of computer operation.

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

The task 1 for this course starts in week 3. This include a series of quizzes and activities where students get feedback on their performances.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Practical / Laboratory Skills, and Written Piece	Individual	40%	1500 words report on image analysis	Refer to Format	Online Assignment Submission with plagiarism check
All	2	Report	Individual	40%	Completing the fieldwork activity sheets (6 marks) Completing the fieldwork spreadsheet (4 marks) 1500 words report of surveying and mapping (30 marks)	Refer to Format	Online Assignment Submission with plagiarism check
All	3	Examination - Centrally Scheduled	Individual	20%	2 hours	Exam Period	Exam Venue

All - Assessment Task 1: Report on remote sensing image analysis and interpretation

GOAL:	The purpose of this task is for you to develop your skills and knowledge to interpret, analyse, and evaluate the provided digital satellite imagery from different sensors for specific landscape features with different image analysis tools.
PRODUCT:	Practical / Laboratory Skills, and Written Piece
FORMAT:	Submit: Week4, Week5, and Week 7. This task will have three parts. The first part will be about interpreting remote sensing images. The second part will be about comparing different satellite sensors. While the third part will be an individual report as a MS Word file with 1500 words. The report will require remote sensing image analysis of earth using different image analysis techniques. You will identify a study area and subsequently collect remote sensing data of the area. You will analyse the remote sensing digital data using image enhancement, image classification and/or change detection techniques.

CRITERIA:	No.	Learning Outcome assessed
	1 Ability to visually interpret satellite images	1 2
	2 Ability to understand satellite sensors	1
	3 Analysis and application of remote sensing techniques	3
	4 Selection of image analysis tools	3
	5 Processing the image to achieve the set goals	1
	6 Presentation of results	4

All - Assessment Task 2: Data sheets, spreadsheet, and report on surveying and mapping of field information and its relationship with remote sensing data sets

GOAL:	This task will consolidate your learning across the course. You will compare the information collected through remote sensing techniques with the information collected through surveying techniques for ground truthing. The ground truthing will be undertaken using basic surveying techniques and using the global navigation satellite systems (GNSS) receivers. For this, you will plan and undertake field-based data-capture operation using a variety of techniques. These techniques will involve use of basic surveying with instruments such as a compass, theodolite, range finders and tape measure. The captured data-sets will be tabulated for traverse calculation and mapped digitally in a GIS.	
PRODUCT:	Report	
FORMAT:	Submit: Week 10 Week, 11 and Week 13. Completed data sheets and spreadsheets on surveying and mapping for the first two parts, For the final part, an individual report as a MS Word file with 1500 words. The report will require mapping of the field data collected using conventional surveying techniques and using GNSS such as GPS. You will collect and or analyse data that will relate to this task. That process will ensure that you stay up to date and enable you to receive feedback on your learning in this large project. You will present methods of data collection and its subsequent mapping in geographical information systems.	
CRITERIA:	No.	Learning Outcome assessed
	1 Ability to conduct surveying for field data collection	1 2
	2 Ability to map (manually as well as digitally) the data collected through surveying	1 2 4
	3 Documenting the use of tools, technique and methodology Critical spatial thinking	1 2 4

All - Assessment Task 3: Quizzes and activities (20%)

GOAL:	This assessment task will facilitate your learning of geospatial technologies while considering the theoretical foundations. You will demonstrate your understanding of the critical concepts behind different geospatial techniques and their subsequent applications for observing and analysing earth resources.	
PRODUCT:	Examination - Centrally Scheduled	
FORMAT:	A combination of multiple-choice and short-answer questions	
CRITERIA:	No.	Learning Outcome assessed
	1 Ability to understand the concept behind earth observation data collection and analysis	1 4
	2 Ability to understand concepts behind surveying and mapping methods and tools.	1 4

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Required	CRCSI	2018	Earth Observation: Data, Processing and Applications Series (Full text and other books in series are available online from https://www.crcsi.com.au/history-2/earth-observation-series-2/)	n/a	CRC Spatial Information

8.2. Specific requirements

The later part of this course will require field visits. See instructional manual for clothing requirements. The prescribed tutorial manual must be purchased from the reprographic services.

9. How are risks managed in this course?

Risk assessments have been performed for all field activities and a low level of health and safety risk exists. Some risks concerns may include working in an unknown environment as well as slip and trip hazards. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the [online induction training for students](#), and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

The final mark is in the percentage range 47% to 49.4%

The course is graded using the Standard Grading scale

You have not failed an assessment task in the course due to academic misconduct

10.3. Assessment: Submission penalties

Late submission of assessment tasks may be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.

- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.

- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: [07 5430 1168](tel:0754301168) or using the [SafeZone](#) app. For general enquires contact the SafeUniSC team by phone [07 5456 3864](tel:0754563864) or email safe@usc.edu.au.

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call [07 5430 1226](tel:0754301226) or email studentwellbeing@usc.edu.au.

10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the [Learning Advisers](#) web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to [Student Hub](#), email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, [AccessAbility Services](#) can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to [Student Hub](#), email AccessAbility@usc.edu.au or call 07 5430 2890.

10.8. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit <https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The [Student Charter](#) sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.10. General Enquiries

In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au