

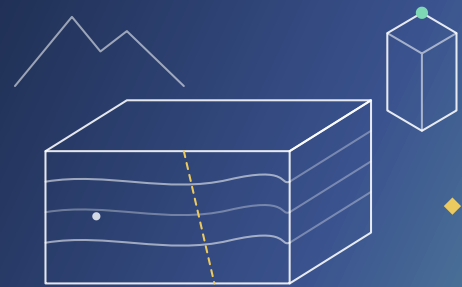
Module code

SPG-3402

Type of module

Undergraduate: Geosciences – Elective

Remote Sensing and Geospatial Science



Modular credits

4

Total student
engagement

56 hours

Prerequisite

**SPG-1203 Introduction
to Geology**

Anti-requisite

None

Aims

To provide theoretical and practical training in remote sensing and geospatial science, covering electromagnetic radiation, satellite imaging, image processing, GIS-based analysis, and applications in geosciences using advanced software to study Earth processes and environmental change.

Module learning outcomes (MLO)

On successful completion of this module, a student will be expected to be able to:

MLO 1

Analyse the physical principles of remote sensing and the interaction of electromagnetic radiation with Earth materials.

MLO 2

Differentiate and evaluate various satellite sensors, resolutions, and their applications in geoscientific studies.

MLO 3

Process and classify remotely sensed data (optical, radar, and hyperspectral) using appropriate image analysis techniques.

MLO 4

Apply GIS and drone-based photogrammetry to analyse spatial datasets and produce high-resolution geospatial outputs.

MLO 5

Design and critically evaluate geospatial workflows incorporating emerging tools such as artificial intelligence and machine learning for environmental and hazard assessment.

Module contents

Fundamentals of remote sensing: EM spectrum, interaction with atmosphere/surface

Satellite platforms: Landsat, Sentinel, MODIS, commercial sensors

Image processing: preprocessing, enhancement, classification, change detection

Radar and LiDAR remote sensing

GIS principles: spatial data models, projections, georeferencing

Advanced geospatial analysis: terrain modelling, hydrological modelling, spatial statistics

Applications: natural hazard monitoring, climate change, urban growth, biodiversity, land-use

Drone remote sensing: data collection and 3D modelling

AI and machine learning in geospatial analysis

Assessment

60% **40%**
Examination Coursework



■ Examination — 60% ■ Field GIS Assignment — 20% ■ Group Lab Project — 20%

Formative assessment

Weekly practicals, discussion and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	60%
Coursework	40%
Individual	20%
Field GIS Assignment	20%
Group	20%
Group Lab Project	20%

Graduate attributes and skills

Programme learning objectives (PLO) addressed

1	PLO 1 (Fundamental Theoretical Knowledge in Geosciences)	2	PLO 2 (Application of Scientific Methods and Data Analysis)
3	PLO 3 (Integrated Laboratory, Field, and Technical Skills)	4	PLO 4 (Data Visualisation and Geospatial Analysis)

Sustainability concept addressed

9	SDG 9 Industry, Innovation, and Infrastructure
11	SDG 11 Sustainable Cities and Communities
13	SDG 13 Climate Action

Digital skills/software used (not limited to)

- Remote sensing platforms (Google Earth Engine, ENVI, ERDAS Imagine)
- GIS (ArcGIS, QGIS)
- Drone photogrammetry tools (Pix4D, Agisoft Metashape)
- Programming: Python (GDAL, Rasterio, geopandas), R (sp, raster)

Micro-credentialling option

Yes, 4 MCs

Stackable towards GenBESTARI Undergraduate Degree Programme or other relevant Lifelong Learning Programmes

No

Document details

Office **ODVCE** Document date **23 June 2026** Status **New** Approval **GBF (12/02/2006)**