

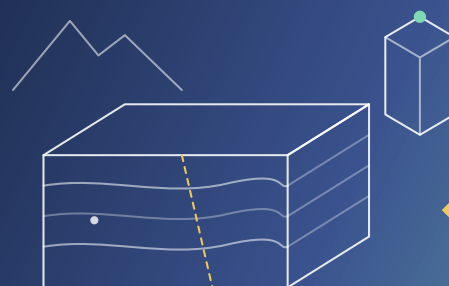
Module code

SPG-3301

Type of module

Undergraduate: Geosciences – Major Option

Geostatistics and Data Analysis



Modular credits

4

Total student
engagement

56 hours

Prerequisite

SPG-1203 Introduction
to Geology

Anti-requisite

None

Aims

To enable students to develop statistical literacy for analysing geological datasets, cultivate awareness of compositional data and its implications, and build proficiency in selecting appropriate statistical methods whilst fostering critical thinking about their limitations in geological contexts.

Module learning outcomes (MLO):

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

MLO 1

Apply statistical thinking and geostatistical methods to analyse geological datasets whilst recognising their unique characteristics and limitations.

MLO 2

Evaluate and interpret geological data using appropriate descriptive statistics, correlation analysis, and regression techniques, including proper handling of compositional data constraints.

MLO 3

Apply statistical methods to complex geological datasets, particularly compositional data.

MLO 4

Demonstrate proficiency in statistical software through practical application of statistical methods to real geological datasets, whilst critically evaluating results and quantifying uncertainty using Bayesian approaches.

Module contents

Foundations and Statistical Principles: Introduces geostatistics, statistical thinking in geosciences, and the unique characteristics of geological datasets

Descriptive Statistics and Data Integrity: Covers data representation, measures of central tendency, outlier detection, and normality testing specifically for geological contexts

Compositional Data Analysis: Addresses the challenges of compositional data including closure constraints, log-ratio transformations, and why conventional statistics fail with geological compositional data

Correlation and Regression: Explores correlation analysis techniques and regression modelling for geological applications, including how to handle compositional data

Multivariate Statistical Methods: Covers PCA, cluster analysis, and discriminant analysis adapted for compositional geological data

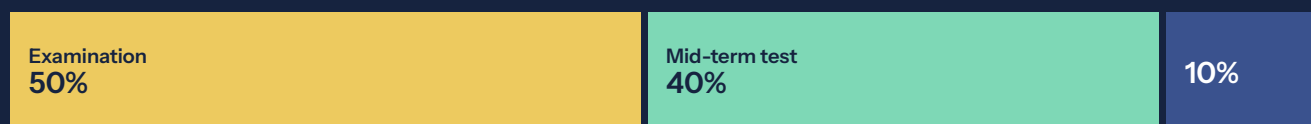
Spatial and Temporal Analysis: Focuses on spatial statistics, variogram analysis, kriging, and time series analysis for geological records

Bayesian Approaches: Introduces Bayesian principles for geological interpretation and uncertainty quantification

Practical Application Focus: Each topic includes practical sessions using real geological datasets to develop hands-on skills with statistical tools like JASP

Assessment

50% Examination
50% Coursework



■ Examination — 50% ■ Mid-term test — 40% ■ Practical reports — 10%

Formative assessment

Weekly discussion and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	50%
Coursework	50%
Individual	50%
Mid-term test	40%
Practical reports	10%

Graduate attributes and skills

Programme learning objectives (PLO) addressed

2	PLO 2 (Application of Scientific Methods and Data Analysis)	3	PLO 3 (Integrated Laboratory, Field, and Technical Skills)
4	PLO 4 (Critical Thinking and Problem-Solving Skills)	6	PLO 6 (Communication and Collaboration Skills)
7	PLO 7 (Independent Learning and Professional Development)		

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)

- Data processing and spreadsheet software (e.g. Microsoft Excel)
- Statistical analysis software (e.g. open-source, multi-platform statistical tools)

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)**