



**DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL MANAGEMENT  
AND ENERGY STUDIES**

**FACULTY OF SCIENCE  
UNIVERSITY OF JOHANNESBURG**

<p><b><i>CERTIFICATE COURSE IN GEO-INFORMATICS 1: GIS (S2GISQ)</i></b></p>
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**(A SAQA registered course)**

**FIRST SEMESTER – 2024**

**Module / Course Title:** Geo-Informatics 1: Geographic Information Systems

**Qualification:** Certificate in Geo- Informatics 1: Geographic Information Systems

**Module / Course Code:** S2GISQ

**Module / Course Credit Value:** 30

**National Qualifications Framework (NQF) Level:** 7

**Name of Lecturers:** Prof. S.G. Tesfamichael / Dr M. Kganyago

**Name of Module / Course Coordinator:** Prof. S.G. Tesfamichael

## 1. THE COURSE

The **Geo-Informatics 1: GIS** course is an NQF Level 7 module that runs for a full semester (14 weeks). The course aims to introduce students to the world of computer assisted spatial analysis by addressing aspects such as geospatial data types and structures; where and how those data can be accessed, manipulated, updated, and managed; and also the production of quality end products (maps, tables, graphs, etc.).

## 2. SCHEDULE

The course is presented during the first semester of each year, with registration starting in January. The first lecture commences on **February 13, 2024 at 13h00**. The last lecture takes place in May (normally 14 contact periods), with an examination starting on May 30. The course can be extended into a separate Geo- Informatics 2 course (this second course focusses on remote sensing and image processing) during the second semester. Applicants who enroll for non-graduate purposes will receive a certificate **on successful completion of the course**.

## 3. ACADEMIC QUALIFICATION AND REQUIREMENTS

The course forms part of the honours degree programme in Geography or can be taken as a non-graduate course leading to a certificate. As part of the formal honours course, candidates must comply with the formal admittance requirements (Geography III passed with 65% or more).

If taken for a non-graduate purpose in order to acquire a **Certificate in Geo-Informatics**, candidates **must have a university degree**. An acceptable diploma with several years of experience in a related field of work **might** also be considered favourably, depending on the type of work experience and type and level of diploma. Computer literacy and Geography as an undergraduate course is highly recommended.

## 4. COURSE CONTENT

The course consists of the following themes which will be covered both through theory and practical sessions. Please note that the course uses Environmental Systems Research Institute's (ESRI®) ArcGIS Pro computing software to run all practical exercises.

1. Introducing GIS
2. Coordinate systems
  - Geographic coordinate system
  - Map projections
  - Projected coordinate systems
3. Spatial data models
  - Vector data model
  - Raster data model

4. Spatial data acquisition
  - Data availability
  - Conversion of existing data
  - Creating new data
5. Geometric transformations
  - Geometric transformation
  - Root Mean Square (RMS) Error
  - Resampling of pixel values
6. Spatial data accuracy
  - Location errors
  - Topological errors
  - Topological editing
  - Non-topological editing
7. Attribute data and management
  - Attribute data in GIS
  - Attribute data entry
  - Attribute data manipulation
8. GIS data display and cartography
  - Cartographic symbolisation
  - Types of maps
  - Typography
  - Map design
  - Map production
9. Data exploration
  - Map-based data manipulation
  - Attribute data query
  - Spatial data query
  - Raster data query
10. Vector data analysis
  - Buffering
  - Overlay
  - Feature manipulation
11. Raster data analysis
  - Local operations
  - Neighbourhood operations
  - Zonal operations
  - Map algebra
12. Terrain mapping and analysis
  - Terrain mapping and analysis
  - Slope and aspect
  - Viewshed analysis
  - Applications of viewshed analysis
  - Watershed analysis
  - Applications of watershed analysis
13. Spatial interpolation
  - Elements of spatial interpolation
  - Global methods
  - Local methods

- Kriging

#### 14. GIS Modeling

- Types of GIS models
- Modelling process
- The role of GIS in modelling

### 5. FEES

The fee for Geo-Informatics 1: GIS is **R12720.00 for 2024** when taken as a non-graduate course. Furthermore, students need to arrange their own computers to take the course, should it become necessary to run the course remotely. The course fee is payable **in advance** during registration (If a student discontinues, a percentage of this fee can be refunded depending on the date of discontinuation).

*Once you have been notified of acceptance to the course, please contact our Faculty Officer Mrs Tsholanang Nyoka at the following address for assistance in the registration process and to obtain invoice.*

- E-mail: [tshulin@uj.ac.za](mailto:tshulin@uj.ac.za)
- Phone: +27 11 559 2459
- Office: C-Ring 201

### 6. APPLICATION

**The application form to enroll for the course is attached at the last page of this document.** Applications to attend the course in the first semester must reach the course coordinator before or on **January 31, 2024 for 2024**. Applications can be made by e-mail given below and must be accompanied by certified copies of previous academic records. *You will then receive a notification on the success of your application.*

To submit an application for enrolment to the course or for further information, contact:

Prof Solomon G. Tesfamichael  
Course coordinator  
Dept. of Geography, Environmental Management and Energy Studies  
University of Johannesburg  
P.O. Box 524  
Auckland Park  
2006

Tel. No. (011) 559-3927  
E-mail: [sgtesfamichael@uj.ac.za](mailto:sgtesfamichael@uj.ac.za) (preferred method)

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## **TAKE NOTE OF THE FOLLOWING ARRANGEMENTS FOR 2024.**

### **Enrolment:**

Enrolment for accepted applicants takes place as follows:

- Department: Geography, Environmental Management and Energy Studies.
- Place: D2 LAB 344H
- Date: February 6 and 7, 2024
- Time: 9H30 – 12H30

For students not previously enrolled at UJ, the enrolment will be faster if you fill in the institution's online application form in advance and get a student number.

### **First lecture:**

- Date: February 13, 2024
- Time: 13H00
- Place: D3 LAB 332

### **Mode of lecture:**

- Lectures and practical sessions will take place in-person offered on campus considering the nature of the course.



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REGISTRATION FORM FOR GEO-INFORMATICS 1: GIS (S2GISQ1)  
FOR CERTIFICATE PURPOSES IN 2024 (First Semester, Part Time)

SURNAME: \_\_\_\_\_ ID NUMBER: \_\_\_\_\_

NAMES: \_\_\_\_\_

Courses previously done at UJ? Yes/No \_\_\_\_\_ UJ Student Number: \_\_\_\_\_

Name(s) of course(s) and date: \_\_\_\_\_

**ACADEMIC QUALIFICATIONS** (PLACE THE NAME OF THE INSTITUTION AT THE END IN BRACKETS):

\_\_\_\_\_  
\_\_\_\_\_

HOME ADDRESS: \_\_\_\_\_

(PROVIDE POSTAL ADDRESS IF  
IT IS DIFFERENT FROM HOME  
ADDRESS)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TEL. NO: (\_\_\_\_) \_\_\_\_\_

WORK ADDRESS: \_\_\_\_\_

\_\_\_\_\_

TEL. NO: (\_\_\_\_) \_\_\_\_\_

I, \_\_\_\_\_, hereby declare that I will adhere to the regulations of the university and the Department of Geography, Environmental Management and Energy Studies. I also declare to pay the required course fee in full at registration after I have been accepted and an official student number has been allocated to me.

**NB!! All payments must be made with reference towards your student number.**

\_\_\_\_\_  
SIGNATURE (Student)

\_\_\_\_\_  
DATE

\_\_\_\_\_  
SIGNATURE  
(Prof S.G. Tesfamichael: COURSE COORDINATOR)

\_\_\_\_\_  
DATE