



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENVIRONMENTAL SCIENCE

DEPARTMENT OF GEOSPATIAL SCIENCE

**BACHELOR OF SCIENCE (HONOURS) DEGREE IN GEOGRAPHICAL INFORMATION SYSTEMS (GIS) AND
REMOTE SENSING IN NATURAL RESOURCES MANAGEMENT**

EARTH COORDINATE SYSTEMS AND GLOBAL POSITIONING SYSTEM

EGR 1203

Regular Examination Paper

March 2025

This examination paper consists of 2 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr Bukhosi Ngqabutho Khumalo

External Examiner: Dr M Shekede

INSTRUCTIONS

1. Answer QUESTION **ONE** AND ANY **THREE** OTHERS
2. Each question carries 25 marks

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
6	25
TOTAL	100

1. a Explain the difference between a geoid and an ellipsoid. [14 marks]
 b. Discuss ANY **THREE** ellipsoids of your choice. [11 marks]

- 2 a. Explain the concept of map projections and discuss the challenges of representing 3D Earth on a 2D surface. [10 marks]
 b. Describe the different types of map projections under the following classifications:
 - i. Distortion Property. [4 marks]
 - ii. Case. [2 marks]
 - iii. Developable Surface. [5 marks]
 - iv. Aspect. [4 marks]

2. (a) Describe the three segments of the Global Positioning System (GPS) and their functions. [15marks]
 (b) Explain how location is determined using GPS [10 marks]

3. Describe the main sources of GPS errors, and their mitigation.

4. Assume you have been hired as a GIS Analyst at the Bulawayo City Council (BCC). BCC has a vast collection of old topographic maps that contain valuable information for urban planning and development. However, these maps are not georeferenced, meaning they cannot be used directly in a GIS environment for spatial analysis.
Your task is to explain how you would use ArcGIS Pro or QGIS to georeference these topographic maps so that they can be integrated into BCC's GIS database for planning purposes.

5. Discuss the contributions of ancient Greek philosophers, in shaping early ideas about the Earth's shape. How did their observations and theories influence later cartographic developments?

END OF EXAMINATION