



ZIMBABWE EZEKIEL GUTI UNIVERSITY

DIPLOMA IN GEOGRAPHICAL INFORMATION SYSTEM

PART 2

GISRS 122: IMAGE ANALYSIS AND CLASSIFICATION

FACILITATOR: MR G. W KATURUZA

TIME: 2 HOURS

DATE: June 2025

10 JUN 2025

INSTRUCTIONS TO CANDIDATES:

1. **Section A:** Question 1 is **compulsory** (40 marks).
2. **Section B:** Answer **any 3 questions** from Questions 2 to 6 (20 marks each).

Overall Total Marks: 100 Marks

ADDITIONAL MATERIALS

- *Answer Booklet.*

Section A: Compulsory Question (40 Marks)

Question 1:

Discuss the process of digital image classification in remote sensing. Your answer should cover:

- a. The difference between supervised and unsupervised image classification. [10 Marks]
- b. The steps involved in preparing satellite imagery for classification. [10 Marks]
- c. Challenges and solutions in land cover classification in Southern Africa. [10 Marks]
- d. Detail **two** examples from Zimbabwe where image classification has been used to support decision-making for land use or environmental management. [10 Marks]

Section B: Optional Questions (Answer Any 3; 20 Marks Each)

Question 2:

- a. Describe the role of radiometric and geometric corrections in image preprocessing. [8 Marks]
- b. Explain how atmospheric correction improves classification accuracy. [6 Marks]
- c. Identify and discuss two sources of error in remote sensing imagery. [6 Marks]

Question 3:

- a. Outline the concept of spectral signatures and their importance in remote sensing. [8 Marks]
- b. With examples, explain how different land covers (e.g., water, vegetation, built-up) can be distinguished using spectral signatures. [6 Marks]
- c. Discuss the limitations of using only spectral information for classification. [6 Marks]

Question 4:

- a. Compare and contrast pixel-based and object-based image analysis. [8 Marks]
- b. Discuss the benefits of object-based classification for urban land cover mapping. [6 Marks]
- c. List and explain two challenges associated with object-based image analysis. [6 Marks]

Question 5:

- a. Describe accuracy assessment methods used in image classification. [8 Marks]
- b. Explain the significance of confusion matrices and kappa statistics in evaluating classification results. [6 Marks]
- c. Discuss sources of reference data for accuracy assessment in Zimbabwean contexts. [6 Marks]

Question 6:

- a. What is change detection in remote sensing? Explain its importance for environmental monitoring. [8 Marks]
- b. Describe two methods used for change detection analysis. [6 Marks]
- c. Provide examples of how change detection has been applied in Zimbabwe for monitoring deforestation or urban expansion. [6 Marks]

****END OF EXAMINATION****