

**UNIVERSITY OF KWAZULU-NATAL**  
**SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES**  
**DISCIPLINE OF GEOGRAPHY**  
**EXAMINATION: JUNE 2014**  
**GIS AND REMOTE SENSING, ENVS 316**

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**DURATION: 3 HOURS**

**TOTAL MARKS: 300**

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**External Examiner: Prof. S. Grab**  
**Internal Examiners: Prof. O. Mutanga**

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**NOTE: THIS PAPERS CONSISTS OF ONE PAGE**

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Answer a total of **THREE** questions, at least **ONE** question from **EACH** section.  
Each question carries 100 marks.

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**Section A**

1. “Departments need to know if GIS is either a tool that should be taught exclusively at the undergraduate level, or a science, thus a legitimate research specialty of faculty and graduate students” Wright et al., 1997: 347. Critically examine this statement using specific examples. [100]
  
2.
  - a. Explain the difference between a projected coordinate system and a geographic coordinate system? [12]
  - b. Map projections can be identified by their class. Discuss the properties of cylindrical, azimuthal and conical projections. As a GIS analyst employed in a tropical country, propose and justify the type of projection you would use to produce relatively accurate maps. [88]
  
3. Vector data structures can be divided into spaghetti and topological models. Describe and explain in detail the characteristics of these two models and discuss their advantages and disadvantages in spatial data analysis. [100]

**Section B**

4. Give an account of the electromagnetic spectrum and explain why certain portions of the spectrum are more important for remote sensing than others. [100]
  
5. ‘Radiation (electromagnetic energy) that is not absorbed or scattered in the atmosphere can reach and interact with the Earth’s surface’. Elaborate on different ways in which incident radiation will interact with targets on the Earth’s surface. With the aid of an illustration, explain the spectral reflectance characteristics of green vegetation. [100]
  
6. Explain the procedures employed in the *supervised* classification of remotely sensed images. Pay particular attention to the predefinition of clusters (classes) and the commonly used classifier algorithms (classifiers). [100]

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