UNIVERSITY OF KWAZULU-NATAL, DURBAN CENTRE
EXAMINATION: MAY 2011

SCHOOL : ENVIRONMENTAL SCIENCES
LEVEL : II
MODULE : BIOPHYSICAL ENVIRONMENTS OF SOUTHERN AFRICA
CODE : ENVS210W1

DURATION: 3 HOURS **TOTAL MARKS: 150**

INTERNAL EXAMINERS: DR J FINCH, DR S PILLAY, DR L RAMSAY
EXTERNAL EXAMINER: PROF O MUTANGA
UNIVERSITY OF KWAZULU-NATAL

INSTRUCTIONS:

1. **USE A SEPARATE ANSWER BOOK FOR EACH SECTION.**
2. **USE NEAT ANNOTATED SKETCH DIAGRAMS TO ILLUSTRATE YOUR ANSWER WHERE NECESSARY.**

SECTION A: GEOMORPHOLOGY

QUESTION 1 (50 MARKS)

Answer **ONE** of the following Essay questions

1 a) Describe and discuss the evolution and characteristics of the fluvial systems of the eastern escarpment and those of the interior of southern Africa.

OR

1 b) Explain how quick conditions may occur in soils/regolith and discuss the types of mass wasting that may result as a consequence.

OR

1 c) Discuss the dynamic interactions taking place at tectonic plate boundaries, the landforms that result and the evidence cited as proof of the main operative processes driving plate tectonics.

SECTION B: ATMOSPHERIC PROCESSES

QUESTION 2 (50 marks)

Answer **ONE** of the following questions

2 a) Explain the formation of a rain shower in a warm cloud, from the time of surface evaporation until the return of the moisture as droplets back to the earth's surface. Include in your essay an example of an intense annual rainfall event over India and discuss its implications for communities there. (**50 marks)**

OR

2 b) Compare the causes and consequences of El Niño and La Niña events. **(50 marks)**

OR

2 c) Many climate modelers have applied a 'scenario approach' to predicting and understanding the implications of changing temperatures and moisture distributions across the globe. Define and explain the need for a scenario approach, and discuss model estimates based upon a 1, 2, 3, 4, 5 and 6° Celsius increases in global average temperature over the next century. **(50 marks)**

SECTION C: BIOGEOGRAPHY

QUESTION 3 (25 marks)

Answer all questions

3 a) Outline, providing examples, the three main types of plant and animal adaptations to arid environments in southern Africa. **(10 marks)**

3 b) Define the following terms, providing examples where appropriate **(5 marks each)**:

i. Fragmentation and edge effects in conservation
ii. Fundamental and realised niche
iii. Measures of diversity

QUESTION 4 (25 marks)

Answer **one** of the following questions

4 a) Discuss recent impacts on southern African environments. Provide examples to justify your response. **(25 marks)**

OR

4 b) Explain the need for a long-term understanding in Biogeography. In your response, define with examples, palaeodating and palaeoreconstruction techniques. **(25 marks)**

UNIVERSITY OF KWAZULU-NATAL, DURBAN CENTRE
SUPPLEMENTARY EXAMINATION: JUNE 2011

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SECTION A: GEOMORPHOLOGY

QUESTION 1 (50 MARKS)

Answer **ONE** of the following Essay questions

1 a) Explain the inter-relationships between fluvial competence and fluvial capacity and show how these concepts can be related to the river channel plan form patterns.

OR

1 b) Given a medium grained granite and a medium grained sandstone, discuss the forms of weathering that would most rapidly lead to the decomposition / disintegration of these blocks and, briefly describe the environments where these processes are most likely to occur.

OR

1 c) Discuss the slope hydrologic model explaining the pathways that water, falling on the slope during a rainfall event, may take to eventually reach the river.

SECTION B: ATMOSPHERIC PROCESSES

QUESTION 2 (50 marks)

Answer **ONE** of the following questions

2 a) Using vector diagrams where necessary, define the various forces involved and explain the formation of geostrophic, gradient and cyclostrophic winds. Further explain why airflow is clockwise around a cyclone and anticlockwise around an anticyclone in the southern hemisphere. **(50 marks)**

OR

2 b) Explain the stages of thunderstorm development, and describe various thunderstorm-related phenomena and their implications for communities on the ground. **(50 marks)**

OR

2 c) Discuss the methodologies available for forecasting/predicting weather and climate from the short term (tomorrow) to the long term (in a 100 years' time). **(50 marks)**

SECTION C: BIOGEOGRAPHY

QUESTION 3 (25 marks)

Answer all questions

3 a) Discuss, providing examples, the role of fire in South African biomes. **(10 marks)**

3 b) Define the following terms, providing examples where appropriate:

i. Methodological uniformitarianism **(4 marks)**
ii. Radiocarbon and Amino Acid Racemisation dating **(4 marks)**
iii. Autochthonous and allocthonous evidence **(4 marks)**
iv. Lazarus taxon **(3 marks)**

QUESTION 4 (25 marks)

Answer **one** of the following questions:

4 a) Discuss the implications of biodiversity loss at the broad scale of South African biomes. Use examples to help justify your response **(25 marks)**.

OR

4 b) Outline and discuss the processes of disturbance and succession, providing examples **(25 marks)**.