UNIVERSITY OF ESWATINI

FACULTY OF SCIENCE AND ENGINEERING

DEPARTMENT OF BIOLOGICAL SCIENCES

MAIN EXAMINAITON PAPER 2019/2020

COURSE CODE: BIO610

TITLE OF PAPER: LANDSCAPE ECOLOGY

TIME ALLOWED: **THREE** (3) HOURS

INSTRUCTIONS: NUMBERS IN BRACKETS DENOTE THE NUMBER OF MARKS

THIS PAPER COMPRISES OF **FIVE QUESTIONS, 25 MARKS EACH, ANSWER ANY FOUR QUESTIONS.**

NO ADDITIONAL MATERIAL (E.G. NOTES, CALCULATORS ETC) MAY BE TAKEN INTO THE EXAMINATION.

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE CHIEF INVIGILATOR

There are five (5) questions in this exam. Answer question 1 the questions in this section

Question 1 Total marks available: 25

a) Give a definition of landscape ecology according to Fahrig 2005 and describe 3 factors central to landscape ecology. [10]

b) Discuss four factors that create landscape patterns. [8]

c) What are the classes of landscape patterns? ...[4]

d) Contrast two types point data ...[3]

Question 2

The equilibrium theory of island biogeography provides specific hypotheses for the species-area relationship, which are often highlighted in graphical form. First, provide a diagram that illustrates how extinction and immigration rates are assumed to vary with island area and isolation and describe the resulting predictions that arise from these relationships, in terms of the number of species and species turnover. [25]

Question 3

a) Using its two components, define the concept of scale, showing how these differ between an organism-centered and management centered perspective and why scale is important in ecological analyses. [10]

b) State four reasons why one would consider using scaling techniques in ecological research. [8]

c) How do we deal with scale in ecological research? [7]

Question 4

a) What is spatial autocorrelation? [5]

b) Contrast two different theoretical semivariogram models, exponential and spherical - and compare with a non-spatial model (constant variance model) [10]

c) In looking at spatial autocorrelation, contrast how results from variograms differ with those from correlograms. [10]

Question 5

You are interested in assessing forest loss and fragmentation that occurred between 1980 and 2006 by quantifying changes in pattern from categorical maps derived from remote sensing taken during these two periods. First, describe why this distinction (the effect of forest loss versus forest fragmentation) is relevant for conservation, in terms of the questions we might ask regarding habitat protection/conservation. One or two sentences should suffice here. Now, briefly describe how you would approach this problem using software such as FRAGSTATS, including your chosen scope of analysis, level of heterogeneity for quantifying this problem, and how you might interpret loss versus fragmentation per se through various metrics or other means. Do not concentrate on the specifics of FRAGSTATS,

but rather the conceptual approach you would take. Don't forget to describe one potential conceptual issue/limitation that might arise in addressing this problem. [25]

END OF EXAMINATION