



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY  
SCHOOL OF BIOLOGICAL SCIENCES**

**UNIVERSITY EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN  
APPLIED INSECT SCIENCE**

**FIRST YEAR SECOND SEMESTER 2023/2024 ACADEMIC YEAR**

**MAIN CAMPUS - REGULAR**

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**COURSE CODE: SBI 5119**

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**COURSE TITLE: GIS FOR ENTOMOLOGISTS**

**EXAM VENUE: STREAM: (MSC)**

**DATE:**

**EXAM SESSION:**

**TIME: 3 HOURS**

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**INSTRUCTIONS:**

- 1. This paper contains two sections (A and B)**
  - 2. Answer ALL questions in Section A and any Two (2) questions in Section B**
  - 3. Requisite shape files will be provided in the examination.**
  - 4. Save your codes and outputs as .pdf files**
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**SECTION A: ANSWER ALL QUESTIONS****(30 MARKS)**

1. Describe the components of a Geographic Information System. (6 marks)
2. Describe the different types of spatial data. (6 marks)
3. Describe the various types of map projections used in mapping. (6 marks)
4. Using a suitable example, describe the term “geospatial analysis”. (6 marks)
5. Describe any three methods of geospatial data compression. (6 marks)

**SECTION B: ANSWER ANY TWO QUESTIONS****(30 MARKS)**

6. Using the data provided (page 3), a vector species distribution, plot the densities of vector across the geographic space. (15 marks)
7. Discuss the different types or remote sensing techniques and their applications. (15 Marks)
8. An entomologist conducted a study to determine economic losses suffered by farmers in Siaya and Busia Counties owing to the infestation of their maize fields by the fall army worm *Spodoptera frugiperda*. Using the shape files and the data provided (page 3), draw a choropleth map of the economic losses by administrative wards. (15 marks)
9. Discuss the importance of species distribution modelling. (15 marks)

Data sets

Question 6

Latitude	Longitude	Species	Count
0.4444	35.7819	Culex quinquefasciatus	25
0.369	36.0465	Culex quinquefasciatus	24
0.4921	35.7323	Culex quinquefasciatus	9
0.4504	35.8358	Culex quinquefasciatus	2
0.5814	35.8142	Culex quinquefasciatus	16
0.3586	36.0494	Culex quinquefasciatus	6
0.4634	36.0934	Culex quinquefasciatus	8
0.3755	35.7908	Culex quinquefasciatus	13
0.4283	35.8657	Culex quinquefasciatus	7
0.4444	35.78193	Culex quinquefasciatus	53
0.369	36.0465	Culex quinquefasciatus	31
0.4921	35.73233	Culex quinquefasciatus	11
0.4504	35.8358	Culex quinquefasciatus	20
0.598	35.8544	Culex quinquefasciatus	9
0.5198	35.81416	Culex quinquefasciatus	28

Question 8

Ward	Loss (Tonnes/acre)	Ward	Loss (Tonnes/acre)
Nambale Township	1.25	Bunyala Central	2.76
Busibwabo	3.42	South Uyoma	2.51
Malaba South	2.25	Sidindi	1.39
Marachi West	3.08	Siaya Township	1.11
Ageng'a Nanguba	2.26	Yala Township	1.40
Bunyala South	1.87	Yimbo East	1.84
North Ugenya	2.45	Bukhayo West	1.42
West Alego	2.96	Ang'urai North	1.66
West Gem	1.99	Amukura West	2.48
Central Sakwa	1.80	Namboboto Nambuku	1.39
West Asembo	2.78	Bunyala North	2.50
Bukhayo East	2.75	West Ugenya	1.81
Malaba North	2.16	Ugunja	2.26
Chakol South	1.10	South East Alego	1.22
Marachi North	2.75	South Gem	2.80
		North Sakwa	3.35