UNIVERSITY OF RUHUNA
FACULTY OF FISHERIES AND MARINE SCIENCES & TECHNOLOGY
Academic Year 2023/2024
Bachelor of Science Honours in Fisheries and Marine Sciences Degree
Bachelor of Science Honours in Marine and Freshwater Sciences Degree

Level III Semester I Examination – October/November 2024

OCG 3152: Statistics for Experimental Analysis II

Time: 2 hours

Answer all questions

1)

a) Explain why statistics is essential in scientific research. **(5 marks)**

b) Briefly describe the measures of central tendency and measures of variability. **(5 marks)**

c) The table below shows the average monthly rainfall (mm/day) for two cities in Sri Lanka. Use descriptive statistics to compare and discuss the rainfall patterns between these two cities. **(15 marks)**

	City A	City B
Jan	2.6	3.9
Feb	3.2	4.0
Mar	3.3	3.4
Apr	3.7	3.0
May	4.8	2.6
Jun	6.7	2.5
Jul	8.1	2.3
Aug	7.4	2.7
Sep	6.0	3.2
Oct	4.5	3.3
Nov	3.7	3.9
Dec	2.9	4.1

2) A student from the faculty of FMST wants to study changes in sea surface temperature (SST, °C) in the Indian Ocean as a response to global warming. He has collected SST data for two different periods (**P1** [1991-2000] and **P2** [2011-2020]) and the data are given below. The mean and standard deviation for **P2** is 28.66 and 0.21 respectively.

P1	28.3	28.4	28.2	28.2	28.3	28.1	28.4	28.8	28.3	28.3
P2	28.4	28.5	28.4	28.5	28.9	28.8	28.7	28.6	28.9	28.9

a) Choose an appropriate statistical test and justify your choice. **(10 marks)**

b) State your hypotheses. **(5 marks)**

c) Using a level of significance, alpha = 0.05, determine if there is a statistically significant change in the SST of the Indian Ocean between these periods. Discuss your results. **(10 marks)**

3) A Sri Lankan scientist is studying changes in rainfall in different regions of Sri Lanka in response to global warming. Specifically, he wants to see if there is a difference in average rainfall during the summer season in three regions. If differences are found, he plans to investigate the possible causes further. To do this, an experiment has been conducted using a completely randomized design with three replications per region, measuring total rainfall at the end of the summer season. The data collected are as follows.

Region	**Rainfall (mm)**
Galle	105, 110, 95
Matara	130, 125, 140
Hambanthota	90, 85, 95

a) Identify the variables, factors and levels in this study. **(5 marks)**

b) State the null and alternative hypotheses for this analysis. **(5 marks)**

c) Select an appropriate statistical test to analyze the data and justify your choice. **(5 marks)**

d) At a level of significance, alpha = 0.05, determine whether there is a statistically significant difference in rainfall between the regions. Interpret and discuss your results. **(10 marks)**

4) As a scientist, you have been asked to investigate changes in dissolved oxygen (DO) levels in the waters around Sri Lanka. Describe how you would design and carry out this research, including: hypothesis, plan for data collection, selection of appropriate statistical tests to analyze the data, and discussion of how you would interpret the results to assess any significant changes in DO levels over time or between different locations.

(25 marks)

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