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 I Semester II Examination – April/May 2025

OCG 1252: Statistics for Experimental Analysis I

Time: 2 hours

Answer all questions

1) A student has measured the monthly sea surface temperature (SST, °C) at Galle harbour during 2020 to 2021 to understand the variations in SST. The data are given below.

	2020	**2021**
Jan	27.2	27.6
Feb	28.1	27.2
Mar	28.4	26.9
Apr	29	27.3
May	28.8	27.7
Jun	28	28
Jul	27.5	28.7
Aug	27	29.1
Sep	26.5	29.5
Oct	27.5	28.4
Nov	27.9	28
Dec	27	27

(a) Calculate the following for the years 2020 and 2021:

1) Mean **(2 marks)**

2) Median **(2 marks)**

3) Standard deviation **(4 marks)**

4) Standard error of the mean **(4 marks)**

5) Interquartile range **(4 marks)**

6) Coefficient of variation **(4 marks)**

(b) Based on your results, discuss the distribution and variability of SST at Galle harbour for the years 2020 and 2021. **(5 marks)**

2) A student from the faculty of FMST wants to study changes in monthly rainfall (mm) in two regions during 2020. He has collected rainfall data for two regions (**R1** and **R2**) and the data are given below.

R1	120	135	140	150	160	155	170	180	190	200	210	195
R2	100	110	115	120	130	125	140	155	160	170	180	165

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

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

c) Using a 5% significance level, determine if there is a statistically significant change in the rainfall between these regions. Discuss your results. **(10 marks)**

3) A Sri Lankan scientist is studying changes in salinity in different coastal regions of Sri Lanka. Specifically, he wants to see if there is a difference in average salinity 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 salinity at the end of the summer season. The data collected are as follows.

Region	**Slainity (psu)**
Galle	34.2, 34.4, 34.3
Matara	33.6, 34, 33.9
Hambanthota	32.5, 32.7, 31

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 5% significance level, determine whether there is a statistically significant difference in salinity between the regions. Interpret and discuss your results. **(10 marks)**

4) A student is conducting research to determine the relationship between monthly sea surface temperature (SST, °C) and chlorophyll-a concentration (Chl-a, mg/m³) in the Arabian Sea region. The data collected are given below.

SST	27.5	27.8	28.1	28.4	28.6	28.9	29.2	29.4	29.7	30.0	30.2	30.4
Chl-a	0.45	0.42	0.40	0.37	0.35	0.32	0.30	0.29	0.27	0.26	0.25	0.24

a) Check if there is a significant correlation between SST and chlorophyll-a in the region. **(15 marks)**

b) Interpret the nature of the relationship between SST and chlorophyll-a concentration. What might be the environmental reason for this relationship? **(10 marks)**

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