Basic Sciences Unit

College of Agricultural Engineering Sciences

University of Salahaddin- Erbil

Subject: Practical – Principle of Statistics

Course Book – (Year 1)

Lecturer's name M. Sc., Mr. Hemin Hussein Ali

Academic Year: 2021-2022

Course Book

1. Course name	Practical – Principle of Biostatistics
2. Lecturer in charge	Mr. Hemin Hussein Ali
3. Department/ College	Animal Resources/ College of Agricultural Engineering Sciences
4. Contact	e-mail: Hemin.ali@su.edu.krd Tel: (optional)
5. Time (in hours) per week	Theory: 2 Practical: 3
6. Office hours	9 hours
7. Course code	
8. Teacher's academic profile	I leave school on (15/9/2004) and my graduate university on (24/8/2008) in Sulimania University, Animal production Dept. After my graduation, I employed at Salahaddin University- Erbil, College of Agricultural Engineering Sciences, Registrations unite from 20th/August/2009 till 14th /September/2010. My major work where was; Reception of graduate students for their affairs like creating graduate certification for (MSc., PhD) and supporting latter for employing them and I was checking students' documents. I had been transported my duty to same College but department of Animal Resources. As sub-assistant lecturer from 14th /September/2010 until 22/8/2011. After, I got M. Sc. in Biotechnology from Bangalore University, Bangalore, India. (2013). I got Scientific Title (Assistant Lecturer) on 31st / March/ 2014 then, I work as an assistant Lecturer at department of Animal Resources, College of Agricultural Engineering Sciences, Salahaddin University- Erbil until now. I am assistant lecturer for the following subjects; Animal biotechnology, Principle of Microbiology, Principle of Biostatistics, General Zoology, and Principle of Biochemistry for many semesters and supervising final year undergraduate students' research Projects. ➢ **Currently**, Also, I am a member of the College Exams Committee for the year (2021/2022) **Also, I have been the following Administrator:**

	➢ College Registrar of Registration Section of College of Agricultural Engineering Sciences, Salahaddin University-Erbil from 24th /October/ 2019 until 24th /September/ 2020, I got corona disease, then I left.
	➢ Administrator (Administrative officer) of Planning Unite of College of Agricultural Engineering Sciences, Salahaddin University- Erbil from 19th /May/ 2019 until 8th /September/ 2019.
	➢ Administrator (Administrative officer) of Library Unite of College of Agricultural Engineering Sciences, Salahaddin University- Erbil from 22nd /February /2017 to 19th /May/ 2019.
	➢ Supervisor of Summer Training (2018-2019) of 3rd stage undergraduate students of the Department of Animal Resources, College of Agricultural Engineering Sciences.
9. Keywords	Statistic, Biostatistics, Data Presentation, Frequency Table, Measures of central tendency and dispersion, Test of Hypothesis; (Z-Test) & (T-Test), Chi-square test, Analysis of variance (ANOVA or F-Ratio) & Correlation and Regression analysis.

10. Course overview:

The basic strategies we will follow are to first focus on the Introduction to Statistics, Biostatistics, Statistical terms, summation notation and types of data presentation, and then examines tables and graphs and frequency distributions. Recognize measures of central tendency and dispersion are critical background for understanding samples and populations, estimates of population parameters and the fundamental elements of hypothesis testing. We will then address z-tests, t-tests, Chi-square test and many of the other biostatistical tools.

Statistics has a crucial role in the scientific process and that we need a good understanding of statistics in order to avoid reaching invalid conclusions concerning the experiments that we do.

The goal of biostatistical analysis is to draw reasonable conclusions from the data and, perhaps even more important, to give precise statements about the level of certainty that ought to be attached to those conclusions.

11. Course objective:

Student successfully completing this course should:

1) Understand and be able to use the basic concepts of biostatistics.

2) How to prepare data to perform statistical analysis.

3) Understand and be able to use the basic tools of biostatistics.

4) How to choose the test, implementation and analysis of results.

5) How to display the results in different tables and figures.

6) Be able to work effectively with a professional biostatistician on problems requiring more advanced concepts and tools.

12. Student's obligation
Student should be attendance all exams, quizzes, homework and group work in the class.

13. Forms of teaching

Different forms of teaching will be used to make the subject clear for the students; power point presentation will be used to explain the subject, to show equations, tables, and color Graphics and Diagrammatics to clarify the subjects and help the students to understand the subject.

Lectures will be given to students before every lesson that helps the students to follow the subject. Question will be given as home work to students and sometimes question will be given during class, they should be answered in the class by group in which each group includes 2-3 students. Also lectures include weekly quiz (in the first ten minutes of the lesson).

14. Assessment scheme
Examination: two exams (15 marks for each exam).
Quiz: (3 marks).
Home work: (2 marks).
Total Marks: **(35%)**

15. Student learning outcome: After completing this course, the student will be able to:

1. Define Statistics and Biostatistics

2. Define and Identify the different types of data and understand why we need to classifying variables

3. Define population and sample and understand the different sampling terminologies

4. Identify the different methods of data organization and Presentation

5. Compute appropriate summary values for a set of data

6. Understand the concepts and characteristics of probabilities and probability distributions

7. Compute probabilities of events and conditional probabilities

8. Understand the concepts of null and alternative hypothesis

9. Describe the different types of statistical tests used when samples are large and small

10. Explain the meaning and application of P – values
11. Understand the concepts of degrees of freedom
12. Explain the meaning and application of linear correlation
13. Explain the meaning and application of linear regression

Understand and utilize basic biostatistical concepts and tools and to facilitate their capacity to seek and utilize biostatistical expertise as may be required when conducting their own project or research.

16. Course Reading List and References:
▪ **Key references:**
1) Jackie Nicholas. 2005. Sigma notation. Mathematics Learning Centre, University of Sydney.
2) CHAP T. LE. 2003. Introductory Biostatistics A John Wiley & Sons Publication United States of America.
3) Bernard Rosner. 2011. Fundamentals of Biostatistics. Brooks/Cole, Cengage Learning. USA

▪ **Useful references:**
4) Veer Bala R. 2011. Fundamentals of Biostatistics. Ane Books Pvt. Ltd. India
5) R.P. Meyyan. and N. Arumugam. 2011. Genetics and Biostatistics. Saras Publication, India.

▪ **Magazines and review (internet):**
6) www.mathcentre.ac.uk /mathcentre 2009

17. The Topics:	Lecturer's name
In this section the lecturer shall write titles of all topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture Each term should include not less than 16 weeks	Lecturer's name ex: (2 hrs) ex: 14/1/2022
18. Practical Topics	
Introduction to Biostatistics & Statistical Symbols (Subscript, Superscript, Symbolic and Summation Notation)	Hemin Hussein Ali (3 hrs) on 13/2/2022
Data Presentation; Tabular, Graphic and Diagrammatic	Hemin Hussein Ali (3 hrs) on 20/2/2022
Terms of Frequency Table & frequency distribution	Hemin Hussein Ali (3 hrs) on 27/2/2022

Measures of central tendency; mean, median and mode	Hemin Hussein Ali (3 hrs) on 6/3/2022
Measures of dispersion (deviation); Range, Variance, Standard Deviation, Coefficient of Variance and Standard Error.	Hemin Hussein Ali (3 hrs) on 13/3/2022
Test of Hypothesis; (T-Test)	Hemin Hussein Ali (3 hrs) on 27/3/2022
Test of Hypothesis; (T-Test)	Hemin Hussein Ali (3 hrs) on 3/4/2022
Test of Hypothesis; (Z-Test)	Hemin Hussein Ali (3 hrs) on 10/4/2022
Analysis of variance (ANOVA or F-Ratio)	Hemin Hussein Ali (3 hrs) on 17/4/2022
Analysis of variance (ANOVA or F-Ratio)	Hemin Hussein Ali (3 hrs) on 24/4/2022
Chi-square test	Hemin Hussein Ali (3 hrs) on 1/5/2022
Correlation analysis	Hemin Hussein Ali (3 hrs) on 8/5/2022
Regression analysis	Hemin Hussein Ali (3 hrs) on 15/5/2022

19. Examinations:

Q) Find the following equations?

1. $\sum_{K=0}^{4} 3^k$

$$= 3^0 + 3^1 + 3^2 + 3^3 + 3^4$$

$$= 1 + 3 + 9 + 27 + 81$$

$$= 121$$

Q) Construct a grouped frequency table for the following data on the basis of weight (in grams) that 40 fishes were sampled from a pond:

34 15 19 20 14 13 20 19 27 17

12 24 25 21 22 18 28 19 15 23

31 14 20 24 26 23 21 30 17 22

29 17 25 16 11 33 29 32 23 19

Answer)

➔ Using the formula, $K = 1 + 3.322 \times \log(n)$

$$= 1 + 3.322 \times \log(40)$$

$$= 1 + 3.322 \times 1.60$$

$$= 6.31 \approx 6 \text{ classes}$$

Maximum value = 34 and Minimum value = 11 → Range = 34 − 11 = 23

$$W = 23/6$$

$$= 3.83 \approx 4$$

Using width of 4, we can construct grouped frequency distribution for the above data as:

Weight of fishes (grams)	Number of fishes Frequency
11 – 14	5
15 – 18	7
19 – 22	11
23 – 26	8
27 – 30	5
31 – 34	4
	$\Sigma f = 40$

Q) Find the mean, median and mode for the length of 9 fishes in cm which is given below?

Length: 12, 20, 17, 13, 20, 14, 19, 20, 18.

Answer, for Mean

It is ungrouped data

n = 9

$\sum$ x = 12 **+** 20 **+** 17 **+** 13 **+** 20 **+** 14 **+** 19 **+** 20 **+** 18

$\sum$ x = 153

$$\overline{X} = \frac{\sum x}{n}$$

$$\overline{X} = \frac{153}{9} \quad = \quad 17 \text{ cm}$$

Answer, for Median

Sort: Length: 12, 13, 14, 17, 18, 19, 20, 20, 20.

$$\text{Median (Md)} = \left[\frac{n + 1}{2} \right]^{th} \text{item}$$
Md = median
n = number of items

$$\text{Md} = \frac{9 + 1}{2} = 5$$

Median= value of the 5th item.

Median= 18 cm

Mode = 20

Q) The research unit in an organisation tested whether scores on the scholastic aptitude test are different for male and female applicants. Random samples of applicant's files are summarized below:

Value	Applicants	
	Females	**Males**
$\overline{X}$	502.1	510.5
SD	86.2	90.4
N	399.0	204.0

Using the above sample data, test the null hypothesis that the average score is the same for male and female applicants. Use 5% level of significance.

20. Extra notes: Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks.	
21. Peer review	پێداچوونەوەی هاوەڵ

Assistant Lecturer: Hemin Hussein Ali   **Dr. Mhemmed S. Abdullah**

Practical Lecturer   **Theory Lecturer**