



**College of Agriculture/ Salahaddin University
Department of Forestry**

Experimental design and analysis

Course Book – (Grade 3)

**Sirwa Anwar Qadir, Ph. D Lecturer
Shaymaa Hani Mahmood, Assistant Lecturer**

Academic Year: 2020/2021

Spring semester

Course Book

1. Course name	Experimental design and analysis
2. Lecturer in charge	Dr. Sirwa Anwar Qadir Miss. Shaymaa Hani Mahmood
3. Department/ College	Forestry department/ Agriculture college
4. Contact	e-mail: sirwa.qadir@su.edu.krd srwa198@gmail.com Tel: 009647504701276 Shaymaa.mahmood @su.edu.krd Tel: 009647507301914
5. Time (in hours) per week	Theory: 2 hrs, practice: 3 hrs
6. Office hours	Availability of the lecturer to the student during the week
7. Course code	
8. Teacher's academic profile	BSc (Bachelor of Science) from Biology department/ College of Science, at Salahaddin University, Erbil, Iraq in July 1999. At 2000 to 2003 Lab assistant at Plant protection Dept. After obtaining MSc (Master of Science) at the college of Education/ Biology department in July 2006 in Plant Physiology, I cooperated as a lecture in Agriculture college, Salahaddin University for a period of 7 years. I have been received Ph. D in plant physiology in an inter-ship program at both Salahaddin University and Universiti Teknologi Malaysia (UTM) July 2017. I have published five journal articles, 1 book chapter, research projects, seminars and broad conference. Dr. Sirwa A. Qadir I have BSc in Agriculture forestry (Salahaddin Uni. 2013), Msc. in Wood Industry (Salahaddin Uni. 2017). I'm an assistant lecturer of Forest Dept. Agriculture college. Shaymaa H. Mahmood
9. Keywords	CRD, RCBD, LSD, DMRT, factorial experiments
10. Course overview:	This course deals with the concepts and techniques used in the design and analysis of experiments. The concepts and different models of an experimental design will be studied, leading to their statistical analysis based on linear models and appropriate graphical methods.
11. Course objective:	At the end of this course, students should: 1. Have a general understanding of basic statistics and how it applies to research. 2. Have a basic understanding of experimental design; how to plan, conduct, analyze and interpret results of basic experiments.

3. Be able to interpret results of experiments as presented in scientific journals, technical reports and similar publications.
4. Be able to input and manage data in a spreadsheet such as Excel.
5. Be familiar with SPSS and be able to use SPSS in data analysis.

12. Student's obligation

Students must complete Learning assessments based on lecture material and supplementary lecture-related material.

13. Forms of teaching

The lecturer will use data show by preparing PowerPoint presentations in which outlines of each lecture will be shown however the details of the lecture will be narrated by the lecturer herself. In some cases, samples will be shown to students to have a close and real idea on the subject.

Each student is expected to do all of his/her own work. I encourage you to use the discussion board to assist one another in completing your homework assignments. (You may also ask me for help with assignments.) However, I expect you to turn in your own work as the end product. For the midterm and final exam, I expect you to do all of your own work. You may use other reference materials at your disposal, such as the text book, other books, or the internet, to help you complete the exam.

14. Assessment scheme

Class attendance will be determined through your quizzes and assignments and tests in practical part in 5. The practical part is given 15 marks in total. Students are evaluated during the semester for the theory part by daily short quizzes which giving 5 marks out of 25. Two term exams 20 mark each out of 25.

15. Student learning outcome:

Having successfully completed this module you will be able to:

- Encounter the principles of randomisation, replication and understand how they apply to practical examples.
- Explore the general theory of factorial and block designs and understand this theory sufficiently to find appropriate designs for specific applications
- Evaluate designs using common optimality criteria and used them to critically compare competing designs
- Applied theory and methods to a variety of applications.
- Used the SPSS statistical software to analyse common forms of experiments.

16. Course Reading List and References:

▪ Key references:

- Clewer, A.G. and D.H. Scarisbrick. 2001. Practical Statistics and Experimental Design for Plant and Crop Science. John Wiley and Sons, LTD. New York
- Morris, T.R. 1999. Experimental Design and Analysis in Animal Sciences. CABI Publishing, New York .
- Bailey, R. (2008). Design of comparative experiments. Cambridge Series in Statistical and Probabilistic Mathematics. Cambridge University Press.
- Dagnelie., P. (1985). Estatística – teoria e métodos. 1º e 2º volume. Publicações Europa-América. Mem Martins.
- Gomez, K. A. e Gomez, A. A. (1984). Statistical procedures for agricultural research. 2nd edition. An International Rice Research Institute Book. John Wiley & Sons. New York.
- Mead, R., Gilmour, S. e Mead, A. (2012). Statistical principles for the design of experiments: applications to real experiments. Cambridge Series in Statistical and Probabilistic Mathematics. Cambridge University Press.
- Montgomery, D. (2012). Design and analysis of experiments. Eighth edition. John Wiley & Sons. New York.

Topics	Lecturer's name
<ul style="list-style-type: none"> • Experimental design and analyses concept • What is statistics? • Some Basic (Technical) Statistical Concepts 	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>Analysis of Variance (ANOVA)</p> <ul style="list-style-type: none"> • Purpose and use of ANOVA • Ways of Analysis • Model of Design • Preparation of ANOVA table 	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>Complete Randomize Design (CRD)</p> <ul style="list-style-type: none"> • Definition of CRD • Layout of Design • Steps of Design Laying out • Principles of the design • Use of CRD 	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>Latin Square Design (LSD)</p> <ul style="list-style-type: none"> • Definition of LSD • Layout of Design • Use of the design 	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>

<p>Randomized Complete Block Design (RCBD)</p> <ul style="list-style-type: none"> • Application • Advantage and disadvantage • Layout of design • Analysis of design • Principles of design 	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>Multiple comparison tests</p> <p>Least Significant Difference (LSD)</p> <ul style="list-style-type: none"> • Calculation of LSD • Use and application of LSD <p>Dunett's test</p> <ul style="list-style-type: none"> • Calculation of Dunett's test • Use and application of Dunett's test <p>DRMRT Duncan's Multiple Range test</p> <ul style="list-style-type: none"> • Calculation of DRMRT <p>Use and application of DRMRT</p>	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>Mid-term exam</p>	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>Factorial Experiment</p> <ul style="list-style-type: none"> • Definition • Advantages and Disadvantages of Factorial Experiment • Combinations Calculations <p>Analysis of Factorial Experiment</p>	<p>Dr. Sirwa A. Qadir (2 hrs)</p> <p>Miss Shaymaa H. (3 hrs)</p>
<p>CRD design in Factorial Experiment</p> <ul style="list-style-type: none"> • Lay out • Advantages and Disadvantages of Factorial Experiment • Multiple comparisons of means in factorial CRD 	<p>Dr. Sirwa A. Qadir (4 hrs)</p> <p>Miss Shaymaa H. (6 hrs)</p>
<p>RCBD design in Factorial Experiment</p> <ul style="list-style-type: none"> • Lay out • Advantages and Disadvantages of Factorial Experiment • Multiple comparisons of means in factorial CRD 	<p>Dr. Sirwa A. Qadir (4 hrs)</p> <p>Miss Shaymaa H. (6 hrs)</p>

<p>Split Plot Design</p> <ul style="list-style-type: none"> • Uses • Advantages and Disadvantages of Split Plot Design • Layout of the design • Calculations • Differences between Split Plot Design and Factorial Experiment • Similarities 	<p>Dr. Sirwa A. Qadir (4 hrs) Miss Shaymaa H. (6 hrs)</p>
<p>2nd midterm exam</p>	<p>Dr. Sirwa A. Qadir (2 hrs) Miss Shaymaa H. (3 hrs)</p>
<p>19. Examinations:</p> <p>1. Definitions, such as: Biotechnology, gene expression,</p> <p>2. What are the advantages and disadvantages of:</p> <p>a. PCR b. AFLP</p> <p>3. What is the difference between such as:</p> <ul style="list-style-type: none"> • DNA and RNA 	
<p>20. Extra notes:</p> <p>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.</p>	
<p>21. Peer review</p> <p style="text-align: right;">پیداچوونہوہی ھاوہل</p> <p>I approve that the course is comprehensive and cover all the aspects of the course.</p> <p>Name: Dr. Tavge Sulaiman Rasheed Degree: Ph.D. Lecturer Date: 20.9 2018</p>	