Instructor: Muhammad Yaseen, PhD (Statistics, UNL-USA)

Email: myaseen208@gmail.com

Course Website: To get access to the course website, drop me an email using your gmail ID. The course material will be available only through the course website and/or LMS of UAF.

Office Hours: Saturday, 09:00 – 10:00 AM

Learning Objectives:

1. To impart knowledge of advanced topics in the design of experiments.
2. To impart practical skills through problem solving using manual as well as computer skills. This course shall help to enhance both these skills in students through assignments which would be solved manually as well as through computers.

Contents: Incomplete block designs, two dimensional lattices, rectangular lattices, balanced incomplete and partial balanced incomplete block designs, generalized lattice designs, alpha designs, Fractional replication, design resolution, blocking in fractional replication, First and second order response surface designs, Taguchi methods, Quasi, magic and super magic latin squares and weighting designs. Latin square type crossover designs. Optimal designs (A optimal, D optimal).

Texts: Mead, R., Gilmour, S. G. and Mead, A. (2012). *Statistical Principles for the Design of Experiments: Applications to Real Experiments.* Cambridge University Press.

Other References:

Mead, R. (1990). *The Design of Experiments: Statistical Principles for Practical Applications.* Cambridge University Press.

Hinkelmann, K. and Kempthorne, O. (2005). *Design and Analysis of Experiments: Volume 2: Advanced Experimental Design.* John Wiley & Sons, Inc.

Cox, D. R. and Reid, N. (2000). *The Theory of the Design of Experiments.* Chapman and Hall/CRC.

Atkinson, A. C. and Donev, A. N. (1992). *Optimum Experimental Designs.* Oxford University Press.

Myers, R. H., Montgomery, D. C. and Anderson-Cook, C. M. (2009). *Response Surface Methodology: Process and Product Optimization Using Designed Experiments.* John Wiley & Sons, Inc.

Prerequisites: Stat-712 and Stat-713, plus basic knowledge of computer

Academic Honesty: You are encouraged to work together on homework, but the work you turn in must be your own (unless the assignment specifically states otherwise). Work on exams must be your own. Any act of academic dishonesty will result in a score of zero on the item in question and notification of department and university officials. Further action may be taken as warranted.

Homework: Homework will be assigned throughout the semester and will give the student an opportunity to test his/her understanding of the material. Approximately 10 homework assignments will be made over the course of the semester. You will always have at least one week to complete them. The only way to learn statistics is to practice working problems, and homework are, therefore, essential parts of the course. **Only use A4 size paper for your work. No late homework will be accepted.**

In-Class Activities: Critical thinking is an integral component of the course. To help you develop your critical thinking skills and better understand some of the ideas presented this semester, you will be asked to do some in-class writing assignments. These writing assignments may include minute essays, a summary of the lecture, or others. Because these writing activities are designed to assist in your learning, rather than to demonstrate what you have learned, these assignments will be graded on a participation basis.

Peer Review: During the semester you will be asked to read and respond to the work of other students. This may include small writing assignments and homework. You will be graded on participation and the level of seriousness with which you approach the task (i.e., giving reasonable, appropriate feedback).

Final Project: There will be a final project in this course. The project will be of your own choice but it must be approved by the instructor. The final project will have (i) **Introduction** (ii) **Material and Methods** (iii) **Results**, and (iv) **Discussion** sections. The introduction section must contain introduction of the problem, short literature review, clear statement of the objectives. The material and methods section will briefly describe data, how data was obtained and the methods that will be used to obtain the objectives. In the results section, you are expected to report the findings of the your analysis. In the discussion section, integrate the numbers with science, elaborate whether your findings make sense, tie your results with earlier findings, highlight the strengths and limitations of your findings and make conjecture.

Exams: Exams will stress understanding and ability to apply the concepts. The final exam will be comprehensive. All students will be expected to take the exams on the announced dates. **Make-up exams will not be given**.

How to be successful in the course? To be successful in this course, I strongly suggest that you should:

- Understand all the material in the course
- Complete all homework
- Read the corresponding sections of the textbook and reference books as we cover the course material
- Understand all computer codes and calculations

Disclaimer: Information contained in this syllabus was, to the best knowledge of the instructor, considered correct and complete when distributed at the beginning of the term. However, this syllabus should not be considered a contract between UAF and any student. The instructor reserves the right, acting within the policies and procedure of UAF, to make changes in course content or instructional technique without notice or obligation.