School of Food and Agricultural Sciences

Course Title: Research Designs and Experimental Statistics
Course Code: FT-610
Resource Person: Dr. SadiaAslam
Department: School of Food and Agricultural Sciences (SFAS)

SFAS Vision

SFAS endeavours to be a premier centre of excellence, offering innovative, high-quality education and professional programs aimed at achieving academic and research excellence, enriching the lives of individuals and making a difference in the world of academia and industry, and to develop a society of professionals, who can contribute towards the betterment of their respective communities.

SFAS Mission Statement

School of Food and Agricultural Sciences (SFAS) provides an intellectually rich, collaborative, research-focused and dedicated learning environment for students, faculty, and staff, while serving the community at various levels. SFAS at UMT has been established with the aim to integrate recent advances in food sciences/technology and agricultural innovations.

Program Learning Objectives

Following are the primary objectives of program that shape our curriculum and academic calendar:

1. To develop a comprehensive understanding of various food production and processing issues faced by the food industry
2. To provide a comprehensive know how about the recent tools that are developed internationally to tackle the food processing issues
3. To train on various analytical instruments and equipment that are relevant to new product development
4. To develop research and analytical skills for effective evaluation of quality issues in various food industries
5. To develop effective scientific writing and publications skills for effective dissemination of research outputs.

Course Learning Objectives

At the completion of the course, a student will be able to:

1. Identify and discuss the role and importance of research in the applied sciences
2. Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project
3. Construct a coherent research proposal that includes an abstract, introduction, literature review, research questions, ethical considerations, and methodology
4. Identify the parts that comprise the thesis and scientific paper and process of writing, explaining and analysing the structure and organization of a research thesis and scientific paper
5. Students should know the types of descriptive statistics typically reported in educational research studies
6. Students should know the criteria that can be used to select an appropriate statistical test to answer a research question or hypothesis and how to conduct a statistical test of a hypothesis

Sr#	Course Learning Objectives	Link with Program Learning Objectives
1.	Identify and discuss the role and importance of research in the applied sciences	1. To develop effective scientific writing and publications skills for effective dissemination of research outputs.
2.	Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project	2. do
3.	Construct a coherent research proposal that includes an abstract, introduction, literature review, research questions, ethical considerations, and methodology	3. do
4.	Identify the parts that comprise the thesis and scientific paper and process of writing, explaining and analysing the structure and organization of a research thesis and scientific paper	4. do
5.	Students should know the types of descriptive statistics typically reported in educational research studies	5. do

Learning Outcomes

- After successful completion of the Course Work, Students have the skills to:
    1. Explain key research concepts and issues
    2. Read, comprehend, and explain research articles in their academic discipline
    3. Select an appropriate statistical test for research problem and conduct a statistical test of a hypothesis

Teaching Methodology (List methodologies used –example are given below)

Interactive Classes:

- Use media to increase student engagement and improve learning outcomes.
- Try adding metaphors to help students remember details.
- Give students a real-world context with extra projects to reinforce skills.
- Provide practical practice within your lessons. Making it relatable will do wonders.
- Find ways to include differentiated lesson plans in research design and experimental statistics classes

Class Participation

Positive, healthy and constructive class participation will be monitored for each class. Particular emphasis will be given to participation during the presentation sessions. The manner in which the question is asked or answered will also be noted. Your participation in class discussion will contribute to the class participation marks.

Word of advice

Assignments/ projects are very demanding and time consuming. Since you might be exposed to the real corporate environment, the ensuing reality checks could be demoralizing and frustrating. So, you must learn to handle the intra group conflicts and any clash of interests. Unless you start working on the assignments/ projects right away from the very first day you are likely to miss the deadlines.

Participant Responsibilities:

Student should be responsible enough to practice whatever they have learnt during class sessions. They should also implement it to other subjects as well. They are expected to come prepared in the class.

Class activities:

Presentations

After careful analysis, resource person will constitute the groups to achieve balanced heterogeneity among groups, for group assignments/projects and will have the final decision in this regard. Every member of the group is expected to be able to handle all aspects of the

assignments. Groups are not allowed to choose presenters for various parts of the presentations; instead resource person will nominate them. Individuals will be judged for their understanding of the topic through question handling. Q/A section of the presentations will weigh heavily for grading of assignments/ projects.

Team Discussions:

During class, each student will work in a team on discussion questions. Teams will be assigned questions, allowed ten minutes for Internet research, and permitted five minutes to present their results. Points are earned by active participation with your team.

Applied Projects:

This is a project-based course. Regular attendance is the best predictor of success. Students work on projects with detailed instructions, teacher demonstrations and video tutorials. Students can come in during Tutorial to make up missed work.

STUDENTS ARE REQUIRED TO READ AND UNDERSTAND ALL ITEMS OUTLINED IN THE PARTICIPANT HANDBOOK

Class Policy: -

- Be on Time
  You need to be at class at the assigned time. After 10 minutes past the assigned time, you will be marked absent.

- Mobile Policy
  TURN OFF YOUR MOBILE PHONE! It is unprofessional to be texting or otherwise.

- Email Policy
  READ YOUR EMAILS! You are responsible if you miss a deadline because you did not read your email.
  Participants should regularly check their university emails accounts regularly and respond accordingly.

- Class Attendance Policy

A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings are absences and will not be counted as present. You have the opportunity to use 6 absences out of 30 classes. Participants with less than 80% of attendance in a course will be given grade 'SA' (Short Attendance) and will not be allowed to

take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip. Otherwise they could reach short attendance.

- Withdraw Policy

Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade W will be awarded to the student which shall have no impact on the calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded "F" grade which shall count in the GPA.

- Moodle

UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. If you are facing any problem using Moodle, visit http://oit.umt.edu.pk/moodle. For further query send your queries to moodle@umt.edu.pk

- Harassment Policy

Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.

- Use of Unfair Means/Honesty Policy

Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

- Plagiarism Policy

All students are required to attach a "Turn tin" report on every assignment, big or small. Any student who attempts to bypass "Turn tin" will receive "F" grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat "Turn tin", he/she will receive a second "F" that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.

- Communication of Results

The results of quizzes, midterms and assignments are communicated to the participants during the semester and answer books are returned to them. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course.

Course Outline

Course code: FT-610 **Course title:** Research Designs and Experimental Statistics

Program	Research Designs and Experimental Statistics
Credit Hours	3 Credit Hours
Duration	One Semester
Prerequisites (If any)	This course has no hurdle requirements
Resource Person Name and Email	Dr. Sadia Aslam Sadia.aslam@umt.edu.pk
Counseling Timing (Room#)	10 hours per week
Contact no.	03347601300
Web Links:- (Face book, Linked In, Google Groups, Other platforms)	

Chairman/Director Programme signature…… Date……..

Dean's signature……Date…… …….

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation	Marks in percentage
Mid-Term (Written/Practical)	20%
Final exam (Written)	40%
Class Participation	5%
Project & Presentation	15%
Quizzes	10%
Assignments	10%
Total	**100%**

Recommended Text Books:

1. C.R. Kothari. Research Methodology: Methods and techniques (2nd ed.). (2004). New Age International (P) Ltd., Publishers. (ISBN (13): 978-81-224-2488-1).
2. Tuckman, B. W. & Harper, B. E. (2012). Conducting educational research (6th ed.). Lanham, MD: Rowan & Littlefield Publishers. (ISBN: 978-1-4422-0964-0).
3. Rubin, Allen & Babbie, Earl (2009). Essential Research Methods for Social Work, Cengage Learning Inc., USA.

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No	Topics to be covered in the course	Learning Objective of this topic	Expected Outcomes from Students	Teaching Method	Assessment Criteria	Deadlines and Homework
1	Research Methods: An Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research	Define research; explain and apply research terms. Understanding about educational research and the audiences that profit from research studies	Group Discussion/ Surprise Questions	Lecture	Research basics such as meanings and objectives of research	Within a Week
2	Research Approaches, Significance of Research, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in Pakistan	Describe the research process and the principle activities and skills associated with the research	Class Activity/Surprise Questions	Lecture	Defining research approaches and explaining different steps involved in the research process	Within a Week

3	Defining the Research Problem, Techniques involved in defining a problem, Research Process, Research Ethics and Integrity	Selecting and properly defining a research problem Understand how to find and formulate it so that it becomes susceptible to research	Quiz/ Practical Assignment	Lecture	Finding the research problem and understanding about the research ethics and integrity	Within a Week
4	Different Research Designs, Basic Principles of Experimental Designs (CRD, RCBD, LSD, factorial designs, optimization designs)	Defining the research problem and the preparation of the design of the research design. Enable to decide regarding what, where, when, how much, by what means concerning an inquiry or a research study constitute a research design	Group Discussion/ Surprise Questions	Lecture	Understand commonly used experimental designs	Within a Week
5	Writing AResearch Proposal and Synopsis: Writing Proposal Hypothesis and Specific Aims, Requirements and components.	Understand how to put together the contents of the research proposal to understand the important issues involved in the research	Assignment/ Assigning group tasks	Assigning group tasks	Creating the research proposal and writing the research hypothesis and research objectives	Within a Week

6	Writing a Thesis or Dissertation	Identify the parts that comprise the thesis and process of writing a research thesis. Explain and analyze the structure and organization of a research thesis	Project/Surprise Questions	Lecture		Within a Week
7	Writing a Scientific Paper	Identify parts that comprise a scientific research paper and process of writing scientific paper. Understand what to include/exclude in the various sections of a research paper (introduction, method, results, discussion, references)	Presentation/Surprise questions	Lecture		

8	Mid Term	Mid Term			Mid Term	Within a Week
8	Introduction to Statistics: basic concepts, measurement and measurement scales, sampling and statistical inference	Understand the basic concepts and terminology of statistics, including the various kinds of variables, measurement, and measurement scales and be able to select a simple random sample and other scientific samples from a population of subjects.	Class activity / Surprise Questions	Lecture Presentation	Basic Concepts of statistics, measurements and sampling	Within a Week

9	Descriptive Statistics: Measures of Central Tendency, Descriptive Statistics: Measures of Dispersion	Understand how data can be appropriately organized and displayed and be able to calculate and interpret measures of central tendency (mean, median, and mode) and measures of dispersion (range, variance, and standard deviation).	Class Activity/ Questions	Lecture/Practical demo of entire exercise on excel, Minitab and SPSS	Basic computation in MS Excel, Use of Minitab and SPSS	Within a Week
10	Hypothesis Testing: A Single Population Mean, The Difference Between Two Population Means, A Single Population Proportion, The Difference Between Two Population Proportions, A Single Population Variance, The Ratio of Two Population Variances	Understand how to correctly state a null and alternative hypothesis and carry out a structured hypothesis test. Understand the concepts of type I error, type II error, and the power of a test and be able to calculate and interpret z, t, F, and chi-square test statistics for making statistical inferences. Understand how to calculate and interpret p values.	Class Activity / Questions	Practical demo of entire exercise	Basic concepts essential to the understanding of hypothesis testing	Within a Week

11	Analysis of variance: Introduction, CRD, RCBD, LSD, Factorial experiments, Multiple comparisons	Understand how the total variation in a data set can be partitioned into different components and be able to compare the means of more than two samples simultaneously. Understand multiple comparison tests and when their use is appropriate.	Class Activity / Questions	Lecture/ Practical demonstration on Statistics, Minitab and SPSS	Partitioning the total variance computed from a data set into components, estimate and test hypotheses about population variances and means, testing of differences among means when there is interest in more than two populations or two or more variables	Within a Week
12	Simple Linear regression and correlation: Regression and correlation model, evaluating the regression equation and correlation coefficient	Students will be able to obtain a simple linear regression model and calculate the coefficient of determination and to interpret tests of regression coefficients and to calculate correlations among variables. Understand how regression and correlation differ and when the use of each is appropriate.	Quiz/Assignment	Lecture/Practica l demo of entire exercise	Exploring the strength of the relationship between two variables using linear regression and correlation	Within a Week

13	Multiple linear regression: obtaining the multiple regression equation, evaluating the multiple regression equation, using the multiple regression equation	Understand how to include more than one independent variable in a regression equation and be able to obtain a multiple regression model and use it to make predictions. Evaluate the multiple regression coefficients and the suitability of the regression model.	Final Project Assignment	Practical demo of entire exercise	Concepts, computations, and interpretations associated with multiple linear regression	Within a Week
14	Multiple Correlation Model	Understand how to calculate and interpret multiple, bivariate, and partial correlation coefficients.	Class Activity / Questions	Practical demo of entire exercise	Concepts, computations, and interpretations associated with analysis of multiple-variable data	Within a Week
15	Final Project Presentations	Final Project	Project	Presentation	Final Project Presentations	-
16	Final Exam	-	-	-	-	-