MA3518: APPLIED STATISTICS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Applied Statistics

Subject Code
MA - Mathematics
Course Number
3518

Academic Unit
Mathematics (MA)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MA2506 Probability and Statistics; or
MA2510 Probability and Statistics

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to give a more in-depth study of statistics with emphasis on data analysis and applications to concrete problems. It helps students understand concepts and techniques of useful statistical methods, and apply statistical tests to diversified real-life problems with software packages.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	perform statistical calculations and analyzes with software package(s), including SAS.	10	x		
2	create and construct linear models and experimental designs which use regression and analysis of variance.	20	x	x	
3	apply a range of statistical methods to evaluate product quality and forecast time series processes.	10		x	
4	apply statistical techniques in assessing risks and modeling related problems.	20	x	x	x
5	perform statistical tests which analyze data sets from scientific studies and determine appropriate data-fitting models.	20		x	x
6	the combination of CILOs 1-5	20	x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Learning through teaching is primarily based on lectures.	1, 2, 3, 4, 5, 6	26 hours in total
2	Laboratory sessions	Learning through laboratory sessions helps students implement techniques of solving statistical problems and analyzing data sets with computing packages, such as SAS.	1	13 hours in total

3	Take-home assignments	Learning through take-home assignments helps students apply basic statistical methods and tests in a range of applications, including quality control and time series analysis.	1, 2, 3, 4, 5	after-class
4	Project	Learning through project helps students formulate real-life problems in a statistical framework with the aid of methods and computing techniques introduced in this course. It also helps students to communicate and collaborate effectively in the team.	1, 2, 3, 4, 5	after-class
5	Math Help Centre	Learning activities in Math Help Centre provides students extra help.	2, 3, 4	after-class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test	1, 2, 5	25	Questions are designed for the first part of the course to see how well students have learned the basics of SAS in statistical work and the techniques of regression and analysis of variance.
2	Hand-in assignments	1, 2, 3, 4, 5	25	These are skills based assessment which enables students to analyze experimental data and model real-life phenomena with statistical methods and computing techniques.
3	Project	1, 2, 3, 4, 5	0	Students are assessed on their ability in applying statistical and computational methods to formulate concrete problems by data testing and model fitting, as well as on the presentation of results with analysis.

4	Formative take-home assignments	1, 2, 3, 4, 5	0	The assignments provide students chances to demonstrate their achievements on methods of applied statistics learned in this course.

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Additional Information for ATs

50% Coursework
50% Examination (Duration: 3 hours, at the end of the semester)

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)

Assessment Task

1. Test

Criterion
Ability to understand the basics of SAS in statistical work and the techniques of regression and analysis of variance

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task

2. Hand-in assignments

Criterion
Ability to analyze experimental data and model real-life phenomena with statistical methods and computing techniques

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
3. Projects

Criterion
Ability to apply statistical methods to formulate concrete problems by data testing and present the models with analysis

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
4. Examination

Criterion
Ability to solve modeling related problems with appropriate statistical methods and the SAS software

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

5. Formative take-home assignments

Criterion

Ability to demonstrate students' achievements on methods of applied statistics learned in this course

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Linear regression; Nonparametric methods; Bayesian methods; Quality control; Analysis of Variances; Computer-based practice; Risk analysis; Time series.

Reading List

Compulsory Readings

	Title
1	Course materials provided

Additional Readings

	Title
1	Brenton Clarke, Linear Models: The Theory and Application of Analysis of Variance, Wiley-Interscience, 1st Edition
2	Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, Introduction to Linear Regression Analysis, 5th Edition