

# SDSC2102: STATISTICAL METHODS AND DATA ANALYSIS

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## Effective Term

Semester B 2023/24

## Part I Course Overview

### Course Title

Statistical Methods and Data Analysis

### Subject Code

SDSC - School of Data Science

### Course Number

2102

### Academic Unit

School of Data Science (DS)

### College/School

School of Data Science (DS)

### 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 introduce essential statistical methods and analytical tools used to analyze data, gain insights, and make informed decisions. In this course, core topics in probability and statistics are reviewed and expanded through on the study and practice of data analytics. Students will learn how to: describe and visualize data; test our understanding against data; and create statistical models based on domain knowledge. This course will let students gain hands-on experience using different statistical techniques and tools. Upon completion of this course, students should be able to think critically about data and apply standard statistical inference procedures to draw conclusions from such analyses.

### Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Summarize common types of data and distributions	10	x		
2	Understand the model of linear regression and be familiar with the linear regression methods	15	x	x	
3	Understand the methods of model selection and apply to statistical models	20	x	x	
4	Understand the generalized linear model	15	x	x	
5	Familiarize the basic time series models and the applications	20	x	x	
6	Employ statistical techniques and tools to gain insights from data of real-life cases	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 self-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	Formal lectures	1, 2, 3, 4, 5, 6	2 hours/week
2	Laboratory work	Apply programming tools to perform statistical analysis and generate analytics results.	4, 5, 6	1 hour/week

### Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks
1	Homework assignments	3, 4, 5, 6	30	
2	Lab work	3, 4, 5, 6	10	

### Continuous Assessment (%)

**Examination (%)**

60

**Examination Duration (Hours)**

2

**Additional Information for ATs**

Note: To pass the course, apart from obtaining a minimum of 40% in the overall mark, a student must also obtain a minimum mark of 30% in both continuous assessment and examination components.

**Assessment Rubrics (AR)**

**Assessment Task**

Homework assignments

**Criterion**

Based on submitted written work to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.

**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**

Lab work

**Criterion**

Based on submitted lab reports to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.

**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

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### Assessment Task

Examination

### Criterion

Based on submitted written work to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.

#### 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

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## Part III Other Information

### Keyword Syllabus

Probability theory, Transformations and Expectations  
 Common families of distributions  
 Joint probability distributions  
 Descriptive statistics  
 Point estimation, Hypothesis testing  
 Simple linear regression and multiple linear regression

### Reading List

#### Compulsory Readings

Title	
1	Applied Statistics and Probability for Engineers
2	Data Analytics: A Small Data Approach

#### Additional Readings

Title	
1	Nil