

BIOS6900: TIME SERIES ANALYSIS

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Time Series Analysis

Subject Code

BIOS - Biostatistics

Course Number

6900

Academic Unit

Biostatistics (BIOS)

College/School

College of Computing (CC)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course will aim to provide students with a working knowledge of modern statistical method for analysing time series data and familiarize them with various forecasting techniques. Topics covered in this course will include ARMA models,

model identification and parameter estimation, model comparison, diagnostic checking, modelling seasonal data, variable selection, syndromic surveillance.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the fundamental necessity and challenges of forecasting in various situations	15	x	x	
2	Ability to choose and apply an appropriate time series model in a particular environment	50	x	x	x
3	Know how to assess and compare models, and improve forecast with better statistical models based on statistical analysis	35	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.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Teaching	Learning through teaching is primarily based on lectures	1, 2, 3	3 hours/ week
2	Assignments	Learning through assignments (including computer assignments) allows students toperform critical problem analysis and develop hands-on skills using software	1, 2, 3	

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3	30	
2	Midterm/quiz	1, 2, 3	30	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving skills and software usage

Excellent

(A+, A, A-) Consistently demonstrates a thorough understanding of modern statistical method for analysing time series data and applies them to complex problems

Good

(B+, B, B-) Adequately demonstrates an understanding of modern statistical method for analysing time series data and applies them to moderately complex problems

Fair

(C+, C, C-) Demonstrates some understanding of statistical method for analysing time series data and applies them to simple problems

Marginal

(D) Demonstrates limited understanding of statistical method for analysing time series and has limited ability to apply them to simple problems

Failure

(F) Demonstrates little understanding of modern statistical method for analysing time series data and is unable to apply them to problems

Assessment Task

Quizzes/ Midterm (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Demonstrates a comprehensive understanding of modern statistical method for analysing time series data and applies them to complex problems

Good

(B+, B, B-) Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems

Fair

(C+, C, C-) Applies modern statistical method for analysing time series data to solve simple problems with limited success

Marginal

(D) Demonstrates limited understanding of statistical method for analysing time series and has limited ability to apply them to simple problems

Failure

(F) Inappropriately or unable to apply modern statistical method for analysing time series data to solve problems

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Consistently demonstrates a comprehensive understanding of modern statistical method for analysing time series data and applies them to complex problems

Good

(B+, B, B-) Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems

Fair

(C+, C, C-) Demonstrates some understanding of modern statistical method for analysing time series data and applies them to simple problems

Marginal

(D) Demonstrates limited understanding of statistical method for analysing time series and has limited ability to apply them to simple problems

Failure

(F) Demonstrates little understanding of modern statistical method for analysing time series data and is unable to apply them to problems

Assessment Task

Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving skills and software usage

Excellent

(A+, A, A-) Consistently demonstrates a thorough understanding of modern statistical method for analysing time series data and applies them to complex problems

Good

(B+, B) Adequately demonstrates an understanding of modern statistical method for analysing time series data and applies them to moderately complex problems

Marginal

(B-, C+, C) Demonstrates some understanding of statistical method for analysing time series data and applies them to simple problems

Failure

(F) Demonstrates little understanding of modern statistical method for analysing time series data and is unable to apply them to problems

Assessment Task

Midterm/quiz (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Demonstrates a comprehensive understanding of modern statistical method for analysing time series data and applies them to complex problems

Good

(B+, B) Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems

Marginal

(B-, C+, C) Applies modern statistical method for analysing time series data to solve simple problems with limited success

Failure

(F) Inappropriately or unable to apply modern statistical method for analysing time series data to solve problems

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Problem solving based on comprehensive understanding

Excellent

(A+, A, A-) Consistently demonstrates a comprehensive understanding of modern statistical method for analysing time series data and applies them to complex problems

Good

(B+, B) Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems

Marginal

(B-, C+, C) Demonstrates some understanding of modern statistical method for analysing time series data and applies them to simple problems

Failure

(F) Demonstrates little understanding of modern statistical method for analysing time series data and is unable to apply them to problems

Part III Other Information**Keyword Syllabus**

Autoregression; Smoothing; Causality; Confidence interval and hypothesis testing; Stationary models; Model checking; Seasonal effect

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	Forecasting and Time Series", by Bowerman and O'Connell
2	Time Series Analysis: Forecasting and Control" by Box, Jenkins, Reinsel and Ljung