

Scheme of Work

Course Name:		Time Series Analysis and Forecasting			
Course Code:		AQ061-3-M-ODL			
Credit Hours:		3			
Version Number:		VE1		Effective Date:	01 January 2023
Module Leader		Lee Chee Nian			
Learning Topics and Activities					
Week #	Weekly learning Outcomes	Topic Coverage	Hours	In class Learning Activities	Independent Learning Activities
1-2	<ul style="list-style-type: none">Students will have a broad understanding of time series characteristics, correlogram, autocorrelation, and stationary time series.Students will be able to explain the characteristics of time series.Students will be able to solve the model using computer software and interpret the results.	Characteristics of Time Series <ul style="list-style-type: none">IntroductionFeatures of time Series dataTime Series Plots – correlogramStationary Time Series	16 (2L 2T 12Ind)	<ul style="list-style-type: none">Lecturer to introduce basic conceptsReinforce by class discussion and participation which is geared towards the students’ ability to understand the subject matter.Examples discussed with complete solution using computer software.Discussion on case studies led by the lecturer on the concept.Class exercises given to students.	<ul style="list-style-type: none">Read the materials and practice the exercises given to enhance the skills in time series components.Read up the relevant material in the subject manual.Complete the exercises given.
3-4	<ul style="list-style-type: none">Students will have a broad understanding of forecasting techniques, what the most commonly used methods are and how to integrate them into decision making process.	Smoothing Techniques <ul style="list-style-type: none">Moving averageWeighted Moving averageDecompositionExponential SmoothingDouble exponential	28 (4.5L 1.5T 22Ind)	<ul style="list-style-type: none">An inquiry-based activity that encourages students to explore the forecasting techniques taught in the topic.	<ul style="list-style-type: none">Read the materials and practice the exercises given to enhance the skills in the smoothing techniques.

	<ul style="list-style-type: none"> Students will be able to select an appropriate model for time-related data; learn what the methods can and can't do, what their strengths and weaknesses are; analyse the data, with or without software and interpret the result. Students will be able to solve the model using computer software and interpret the results. 	smoothing <ul style="list-style-type: none"> Winter's smoothing 		<ul style="list-style-type: none"> Discussion led by the tutor on the concept. Concepts are demonstrated in numerous examples with complete solution. Case study to let the students practice and apply their learning, especially to real-life problems. Lab session to apply the techniques on the data collected 	<ul style="list-style-type: none"> Complete the exercises given.
5	<ul style="list-style-type: none"> Students will be able to make data partitioning. Students will understand the importance of the measurement of errors associated with a forecasting system and how they are used to monitor the forecasting system. Students will be able to use computer software to solve the problems and interpret the results. 	Performance Evaluation <ul style="list-style-type: none"> Data Partitioning Naive Forecasts Measuring Predictive Accuracy Evaluating Forecast Uncertainty 	13.5 (2L 0.5T 11Ind)	<ul style="list-style-type: none"> An inquiry-based activity that encourages students to explore the forecasting techniques taught in the topic. Concepts are demonstrated in numerous examples with complete solution. Case study to let the students practice and apply their learning, especially to real-life problems. Lab session to apply the techniques on the data collected Give out Individual Assignment (Topic: Smoothing Techniques and Box Jenkins Methodology). 	<ul style="list-style-type: none"> Read the materials and practice the exercises given to enhance the skills in time series components. Complete the exercises given.

6-7	<ul style="list-style-type: none"> Students will be able to use Box Jenkins Methodology to produce accurate forecasts based on a description of historical patterns in the data. Students will be able to solve the model using computer software and interpret the results. 	Box Jenkins Methodology <ul style="list-style-type: none"> Autoregressive (AR) Moving Average (MA) Autoregressive Moving Average (ARMA) Autoregressive Integrated Moving Average (ARIMA) Building ARIMA Models Seasonal Auto Regressive Integrated Moving Average (SARIMA) Building SARIMA Models 	39 (6L 2T 31Ind)	<ul style="list-style-type: none"> An inquiry-based activity that encourages students to explore the Box Jenkins Methodology taught in the topic. Discussion led by the tutor on the concept Concepts are demonstrated in numerous examples with complete solution and interpretation Case study to let the students practice and apply their learning, especially to real-life problems. Lab session to apply the techniques on the data collected 	<ul style="list-style-type: none"> Read the materials and practice the exercises given to enhance the skills in Box Jenkins Methodology. Complete the exercises given.
8	<ul style="list-style-type: none"> Students will be able to understand the ARCH and GARCH model estimation. Students will be able to solve the model using computer software and interpret the results. 	Volatile Models <ul style="list-style-type: none"> ARCH Model Estimation GARCH Model Estimation 	3.5 (1.5L 2Ind)	<ul style="list-style-type: none"> Concepts are demonstrated in numerous examples with complete solution Case study to let the students practice and apply their learning, especially to real-life problems. Lab session to apply the techniques on the data collected Conduct Class Test (Topics: Characteristics of Time Series, Smoothing Techniques, Performance Evaluation, Box Jenkins 	<ul style="list-style-type: none"> Read the materials and practice the exercises given to enhance the skills in time series components. Complete the exercises given.

				Methodology and Volatile Models).	
Assessment Strategies					
Assessment	Description		Duration		Marks Allocation
Final Assessment					
Continuous Assessment	Class Test		2 hours		40%
	Individual Assignment		-		60%
Language For Learning: This must list and define all terms and vocabulary specific to this course					
<ul style="list-style-type: none">• Autocorrelation• Correlogram• Error measures• Forecasting• Moving average• Exponential smoothing• Decomposition• Stationary series• Trend• Seasonal• Cyclical• Residual variations• AR• MA• ARMA• ARIMA• SARIMA• ARCH					

- GARCH