

**City University of Hong Kong
Course Syllabus**

**offered by Department of Advanced Design and Systems Engineering
with effect from Semester A 2022 / 23**

Part I Course Overview

Course Title:	Forecasting and Control Using Regression, Time Series, and Dynamic Models
Course Code:	ADSE8102
Course Duration:	One semester
Credit Units:	3
Level:	R8
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites:	University level mathematics
Precursors:	University level course in probability and statistics
Equivalent Courses:	SEEM8102 Forecasting and Control Using Regression, Time Series, and Dynamic Models (offered until 2021/22)
Exclusive Courses:	Nil

Part II Course Details

1. Abstract

This course aims to educate and to train students and other professionals in business, engineering, mathematics, economics, and statistics, to the principles and the methods for predicting, forecasting, and controlling, using probabilistic and statistical methods. It will start with an overview of methods for quantifying uncertainty, followed by methods of predicting binary outcomes. It will then discuss regression and time series based models, such as autoregressive-moving average processes, for predicting non-binary outcomes. This will be followed by a use of dynamic (or state-space/Kalman Filter) models for prediction and control. Theoretical underpinning will be emphasized and assignments will entail exercises as well as the analysis of data and/or the class participants.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Quantify uncertainty by probability and statistical methods	30%	✓	✓	
2.	Predict binary exchangeable sequences	20%		✓	✓
3.	Use regression based models for forecasting	10%		✓	✓
4.	Use time series based (stochastic process) models for prediction	15%		✓	✓
5.	Use dynamic (Kalman Filter) models for prediction and control	5%		✓	✓
6.	Communicate orally and in writing, project and results.	20%			
		100%			

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.

3. Teaching and Learning Activities (TLAs)

TLA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lecture	Appreciate Underlying Theory	✓	✓	✓	✓	✓	25 hours/sem
Tutorial	Application of Theory	✓	✓	✓	✓	✓	14 hours/sem

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4	5	6		
Continuous Assessment: <u>40</u> %								
Assignment	✓	✓	✓	✓	✓	✓	40%	
Examination: <u>60</u> % (duration: 2 hours , if applicable)								
							100%	

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

5. Assessment Rubrics

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Assignment	20%	Excellent	Good	Marginal	Failure
2. Examination	80%	Excellent	Good	Marginal	Failure

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignment	20%	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Examination	80%	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information

1. Keyword Syllabus

Prediction, Forecasting, Kalman Filtering, Control, Stochastic Process, Regression, Time Series analysis.

2. Reading List

2.1 Compulsory Readings

NIL

2.2 Additional Readings

NIL