THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
香港科技大學

ISOM4540 Time Series Analysis and Forecasting (L1)
Spring Semester 2021/22

Course Outline

Instructor	Dr. Jason MW HO
	Visiting Assistant Professor of ISOM
Office Location	LSK4082B
Office Hours	By appointment
Email	imjasonho@ust.hk
Phone	(852) 3469 2989
Website	https://facultyprofiles.ust.hk/profiles.php?profile=jason-man-wai-ho-imjasonho
Teaching Assistants	Mr. Serafim PETROV
	Ms. Chun HUI
Email	impetrov@ust.hk
	chuiab@connect.ust.hk

Class Schedule and Location

Lecture: Room 2504, 0900-1020 (every Monday and Wednesday), 7th February – 11th May 2022
Tutorial: LSK Room G021, 1630-1720 (every Thursday), 17th February – 5th May 2022

Course Description and Objectives

The objective of this course is to equip students with various forecasting techniques and knowledge on modern statistical methods for analyzing time series data, with emphasis on both theoretical aspects and hands-on experience. The course consists of four parts: I. Fundamentals of time series analysis; II. Univariate methods; III. Regression methods; IV. Box-Jenkins methods.

Intended Learning Outcomes

Upon completion of the course, you should be able to
- Understand the fundamental advantage and necessity of forecasting in various situations.
- Know how to choose an appropriate forecasting method in a particular environment.
- Know how to apply various forecasting methods, which includes obtaining the relevant data and carrying out the necessary statistical analysis (via writing and running R codes).

Teaching Method

The method is lecturing aided by directed discussion. The context of the relevant concepts and methods will be presented first followed by the discussion of pre-designed questions and examples to explore the concepts and methods in depth. During tutorials, necessary commands in

R for carrying out the methods during lectures will be introduced and discussed. Examples of statistical analyses discussed in lectures will be demonstrated.

Course Materials

Class PowerPoints, and other information posted on the course website on Canvas
Required software: R
Reference Textbooks:

- *Forecasting: Principles and Practice* (2nd ed), Rob J Hyndman and George Athanasopoulos, OTexts (2018)
- *Introductory Time Series with R (Use R!)*, Paul S.P. Cowpertwait and Andrew V. Metcalfe, Springer (2009)
- *Time Series Analysis and Its Applications (With R Examples)*, Robert H. Shumway and David S. Stoffer, Springer (2017).

Assessment Scheme

Your grade is based on the following components:
1. Assignments 30% [three sets, @10%]
2. Midterm Examination 20% [in-class on 4th April 2022]
3. Final Examination 50% [To be announced]

Academic Integrity
Without academic integrity, there is no serious learning. Thus, you are expected to hold the highest standard of academic integrity in the course. No cheating, or plagiarism will be tolerated. Anyone caught cheating, or plagiarism will fail the course. Please adhere to the HKUST Academic Honor Code at all time (see http://www.ust.hk/vpaao/integrity/).

Course Schedule

Module/Activity	Date
Module 1. Introduction	Feb 7
Module 2. Time Series Features	Feb 9, 14
Module 3. The Forecaster's Toolbox	Feb 16, 21, 23
Module 4. Time Series Decomposition	Feb 28
Module 5. Exponential Smoothing	Mar 2, 7, 9, 14
Module 6. Time Series Regression Models	Mar 16, 21, 23, 28, 30
Midterm Examination on Modules 1-5	Apr 4
Module 7. ARMA Models	Apr 6, 11, 20, 25
Module 8. ARIMA Models	Apr 27; May 4, 11