ISE043 TIME SERIES ANALYSIS AND FORECASTING

Course Information

Term:	2024-2025 Fall
Faculty:	Engineering and Natural Sciences
Department:	Industrial Engineering
Course Type:	Elective
T/P/ECTS:	3/2/7
Pre-requisite(s):	MATH210 Probability and Statistics or equivalent Python programming language
Course Times:	Wednesday / 13:00-15:30
Classroom:	AB410

Professor:	Nadi Serhan Aydın	**Teaching Assistant:**	N/A
Office:	Vadi B Blok, No:917	**Office:**	N/A
Office Hours:	tba	**Office Hours:**	N/A
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Course Description

This applied course aims to teach students the basic concepts and algorithms of time series analysis and forecasting. All applications will be based on Python language. The course will cover, inter alia, decomposition of time series, the concept of stationarity and its importance in time series modelling, methods for smoothing time series,

Learning Outcomes

After successfully completing this course, you will be able to:

1. Understand how to **decompose** time series
2. Understand and detect **stationarity**
3. Understand how to **smoothen** time series
4. Understand and use **ARMA models**
5. Understand and use **ARIMA/SARIMA models**
6. Apply Box-Jenkins methods for **forecasting**

Course Resources

- Brownlee, J. (2017). Introduction to Time Series Forecasting With Python. Machine Learning Mastery: Vermont, Australia. *(book)*
- Montgomery, D. C., Jennings, C. L., & Kulahci, M. (2015). Time series analysis and forecasting. Introduction to Time Series Analysis and Forecasting, 1-671. *(book)*
- IBM Times Series Course *(online)*

Participation

Every student must attend at least 70% of the lectures to avoid failing with DZ (non-attendance). Students not joining the class within the **first 20 minutes** will be considered absent.

Grading Structure

As per university rules and regulations, the weight of the final exam must be a minimum of 40%. To assess the performance of the students, faculty members will determine other evaluation tools and their weights based on the course structure.

Assignment	Percentage %
Midterm Exam	**30%**
Course Project or Assignments	**25%**
Final Exam	**45%**
Total	**100%**

Course Outline

The format of this section will vary based on the design of your course and the semester, but our guidance is to aim for a clear and concise table that maps out all the assignment assessments and deadlines and gives students a sense of the course's organization.

Week	Topic	To Do (Classroom/Lab)	Deadlines
1	Introduction		
2	Decomposing time series		
3	Decomposing time series		
4	Stationarity of times series		
5	Stationarity of times series		
6	Smoothing times series		
7	Smoothing times series		
8	*Midterm exam*		
9	Box Jenkins methods: ARMA / ARIMA / SARIMA models		
10	Box Jenkins methods: ARMA / ARIMA / SARIMA models		
11	Box Jenkins methods: ARMA / ARIMA / SARIMA models		
12	Box Jenkins methods: ARMA / ARIMA / SARIMA models		
13	Forecasting with Box Jenkins methods		

14	Mini-project presentations		
15-16	*Final exam*		

Disabled Student Support:

It is very important for me to create a learning experience which is as accessible as possible. If you have any issues related to course materials, format, or requirements of this course, please stop by my office so we can explore potential options. Students with disabilities may also wish to work with the Disabled Student Unit to discuss a range of options to removing barriers in this course.

Academic Integrity

All university policies on academic integrity apply to our course, and they will be enforced. In particular, no form of cheating is welcome in the exam, homework, project report or quizzes, such as copying whole or part of each other's answers, using cheat-sheets etc.

Announcements

You are responsible for every announcement made in class, on OİS or on Blackboard. Not attending the class or not checking announcements or your e-mails regularly is not an excuse, in case you miss something. The exact date and time for midterms, and more detailed information will be announced in due course. The university will later announce the final exam date.

Make-up Exams

Make-up exam requests must be made to the Faculty Secretariat in accordance with the regulations and in due time. Otherwise, the make-up exam right is forfeited. According to the regulation, make-up exams are given only for midterm and final exams. There will be no make-up exam for missed make-up exam.