Course Information	
Course title	Time Series Analytics
Semester	111-1
Designated for	COMMON GENERAL EDUCATION CENTER Master Program in Statistics of National Taiwan University
Instructor	CHUN-HUNG LAN
Curriculum Number	IE5057
Curriculum Identity Number	546 U4050
Class	
Credits	3.0
Full/Half Yr.	Half
Required/ Elective	Elective
Time	Monday 2,3,4(9:10~12:10)
Remarks	The upper limit of the number of students: 24.
Course introduction video	
Table of Core Capabilities and Curriculum Planning	Table of Core Capabilities and Curriculum Planning

Course Syllabus	
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Course Description	Time series and signals exist everywhere, and, in particular, data collection and analysis are much easier than before with the advancement of modern information technology. This course starts by modeling the standard time series, such as the demands and economic indicators. Digital signals, such as the machine sensor readings, ECG, and sound waves, are then analyzed with signal processing techniques. The goal is to develop a general sense of treating temporal signals.
Course Objective	Students from this course shall learn to: 1. comprehend the characteristics of different time series and signals; 2. understand the time series identification, estimation, and diagnostic; 3. understand the analytical techniques for digital signal processing; 4. apply proper treatments for analyzing time-series data.
Course Requirement	probability & statistics, linear algebra, calculus, and programming skills
Student Workload (expected study time outside of class per week)	
Office Hours	
References	• Box, G. E. P., Jenkins, G. M., Reinsel, G. C., & Ljung, G. M. (2016). Time Series Analysis: Forecasting and Control. • Davis, M. H. A., & Vinter, R. B. (1985). Stochastic Modelling and Control. • Tsay, R. (2010). Analysis of Financial Time Series. • Smith, S. W. (1999). The Scientist and Engineer's Guide to Digital Signal Processing. • Lyons, R. G. (2010). Understanding Digital Signal Processing. • Mallat, S. (2008). A Wavelet Tour of Signal Processing.
Designated reading	
Grading	

No.	Item	%	Explanations for the conditions
1.	Homework	25%	
2.	Mid-term	30%	
3.	Final-term	30%	
4.	Report	12%	
5.	Participation/Typo Hunting	3%	

Progress		
Week	Date	Topic
Week 1	09/05	Review & Preview
Week 2	09/12	Exponential Smoothing Models
Week 3	09/19	Stationarity vs. Invertibility
Week 4	09/26	Univariate Stationary Time Series Models

Holiday

Week 5	10/03	Univariate Stationary Time Series Models
Week 6	10/10	Univariate Stationary Time Series Models
Week 7	10/17	Univariate Nonstationary Time Series Models
Week 8	10/24	Mid-term Exam
Week 9	10/31	Model Identification, Estimation, and Diagnostic
Week 10	11/07	Model Identification, Estimation, and Diagnostic
Week 11	11/14	Model Identification, Estimation, and Diagnostic
Week 12	11/21	Seasonal Time Series Models
Week 13	11/28	Time Series Forecasting and Multivariate Models
Week 14	12/05	Time-Frequency Analysis
Week 15	12/12	Wavelet Transformation
Week 16	12/19	Final-term Exam
Week 17	12/26	Report Due

Signal processing