University of Toronto

TIME SERIES ANALYSIS *STA457H1*

COURSE OUTLINE (2019 Summer, May-June)

Instructor: Jen-Wen Lin, PhD, CFA

Office Hours: *After Class + By appointment + Special sessions (to announce on Quercus)*

Class Time/Place: *Monday and Wednesday 0600-0900 pm/ ES1050*

Email: jenwen@utstat.toronto.edu

Teaching assistants:

1. *Chang, Leyi,* leyi.chang@mail.utoronto.ca
2. *Dong, Daodao,* daodao.dong@mail.utoronto.ca
3. *Liao, Fangming,* will.liao@mail.utoronto.ca
4. *Yang, Jinda,* jinda.yang@mail.utoronto.ca

- *Please check announcements on Quercus regularly for any updates on Course Outline*

COURSE DESCRIPTION

This course introduces time series analysis with applications in finance and investments. The techniques learned in this course can also be applied to other disciplines. After finishing this course, students are expected to gain hands-on knowledge on how to analyze and model time series data. Topics in this course include fundamental concepts of time series, Box-Jenkins methods (ARIMA models), multivariate time series analysis (transfer function model, Vector autoregression, co-integration), and applications of machine learning techniques in time series analysis, such as bagging and boosting for forecasting time series.

TA OFFICE HOURS

To be announced.

WEIGHTING SCHEME

Marking Scheme (tentative):

> *35% x Midterm-test + 60% x Final+5%x Participation*

- Participation will be measured with attendance and class participation (rules to announce in class)
- Please read and obey academic integrity at University of Toronto (www.artsci.utoronto.ca/osai/students), or see page 3 of Course Outline

TOPICS AND SCHEDULE

# of week	Date	Schedule (Tentative)	
1	06-May	Fundamental concepts	
2	08-May	Fundamental concepts and ARMA model	
3	13-May	ARMA model	
4	15-May	ARIMA model and unit root test	
5	20-May	Victoria Day	
6	22-May	Catch-up	
7	27-May	Midterm test	
8	29-May	Transfer function noise model and intervention analysis	
9	03-Jun	Multivariate time series/return midterm papers (2nd half of class)	Last day to drop (on June 4)
10	05-Jun	Multivariate time series	
11	10-Jun	Bootstrapping and bagging time series	
12	12-Jun	Selective topics and review final Exam	
13	17-Jun	Graduate student presentation	Time and location announced later

o <u>Selective topics</u>
1) MIDAS regression and nowcasting using Google trends
2) Forecasting and boosting time series model
3) Neural network for time series and Kalman filtering

TEXTBOOK (OPTIONAL)

Wei (2005), Time Series Analysis—Univariate and Multivariate Methods.
https://search.library.utoronto.ca/details?5587975&uuid=be2c9580-3b87-4133-897a-04dac9884666

ACADEMIC INTEGRITY

All students, faculty and staff are expected to follow the University's guidelines and policies on academic integrity. For students, this means following the standards of academic honesty when writing assignments, collaborating with fellow students, and writing tests and exams. Ensure that the work you submit for grading represents your own honest efforts. Plagiarism—representing someone else's work as your own or submitting work that you have previously submitted for marks in another class or program—is a serious offence that can result in

sanctions. Speak to me or your TA for advice on anything that you find unclear. To learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at http://www.writing.utoronto.ca. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see http://www.artsci.utoronto.ca/osai and http://academicintegrity.utoronto.ca.