

**MATH 6397-2-13925**

**Time Series Analysis**

**Spring, 2019**

- Instructor: Edward P. C. Kao
- Time: TTH 10:00– 11:30 p.m.
- Class Room: AH 203
- Office: 629-PGH (713) 743-3456, website: [www.math.uh.edu/~edkao](http://www.math.uh.edu/~edkao)  
[edkao@math.uh.edu](mailto:edkao@math.uh.edu)
- Office Hours: TTH 1:00-2:15 p.m., or by appointment
- Course Objective: The course covers the basic ideas in time series analysis. Topics include stationary processes, ARIMA models, nonlinear time series analysis, vector-valued models, cointegration, kalman filters, state space models, and regime-switching paradigms.
- Grading Guide:
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| Homework | 50% |
| Final    | 50% |
- Final Exam: 11:00 am - 1:00 pm, Thursday, May 9 , 2019  
(per UH Spring 2019 Final Exam Schedule)  
Close-book exam, comprehensive, no laptops, no cell-phones, no calculators.
- Reference Texts:
1. *Time Series Analysis*, by James D. Hamilton, Princeton University Press, 1994.
  2. *Hidden markov Models for Time Series: An Introduction Using R*, 2<sup>nd</sup> edition, by Walter Zucchini, Lain L. MacDonald, and Roland Langrock, CRC Press, 2016.
  3. *Time Series Analysis by State Space Methods*, 2<sup>nd</sup> edition, By J. Durbin and S. J. Koopman, Oxford University Press, 2012.
- Homework: Homework will be assigned on every Thursday and due on the following Thursday. No late submission. Hard copy only.

Week	Dates	Topics	References
1	1/15, 1/17	Linear difference equations	Hamilton, Chapters 1, 2,3
2	1/22, 1/24	AR, MA, ARMA, models	Hamilton, Chapter 4
3	1/29, 1/31	ARIMA models	Hamilton, Chapter 4
4	2/5, 2/7	Triangular decomposition Of positive definite matrices	Hamilton, Chapter 5
5	2/12, 2/14	Iterated linear projections	Hamilton, Chapter 5
6	2/19, 2/21	Parameter estimations	Hamilton, Chapter 6
7	2/26, 2/28	Kalman Filters	Hamilton, Chapter 13
8	3/5, 3/7	Kalman Filters	Hamilton, Chapter 13
9	3/12, 3/14	<b>Spring Holidays (no classes)</b>	
10	3/19, 3/21	State space models Local level models	Durbin & Koopman, (2 <sup>nd</sup> ed) Chapter 2
11	3/26 3/28	State space models Linear state space models Hidden Markov models	Durbin & Koopman, (2 <sup>nd</sup> ed) Chapter 3 Zucchini et al, Chapter 1
12	4/2, 4/4	Hidden Markov models	Zucchini et al, Chapters 2, 3
13	4/9, 4/11	Hidden Markov models EM algorithm	Zucchini et al, Chapters 3, 4
14	4/16, 4/18	Hidden Markov models	Zucchini et al, Chapters 5, 6
15	4/23, 4/25	HMM applications, SV models	Zucchini et al, Chapter 20