Course website:  
http://faculty.chicagobooth.edu/ruey.tsay/teaching/mts/sp2017/  
A useful web site for U.S. data:  
Federal Reserve Bank at St Louis: http://research.stlouisfed.org/fred2/  

Lecture: Thursday, 8:30 am to 11:30 am (with 20 minutes break between lectures) Room: HPC 3B  

Lecture Notes: Will be made available one-week in advance if needed.  

Course Objective:  

- To study the basic theory of multivariate processes  
- To gain experience in analyzing multivariate time series data  
- To learn multivariate time series models, including vector AR and ARMA models with exogenous variables  
- To understand co-integration and error-correction models  
- To learn diffusion index, factor models, and their applications  
- To study structural specification of a linear vector process (brief)  
- To model multivariate volatility  
- To learn state-space models and Kalman filter.  
- To study high-dimensional time series analysis (with emphasis)

Web page for the textbook:  
http://faculty.chicagobooth.edu/ruey.tsay/teaching/mtsbk/

Additional References:


Articles: Assigned readings often include journal articles. You may download them from e-journals via the library.

Office hour:
Wednesday: 4:00 pm to 5:00 pm or by appointment.
My phone number 702-6750, My office: Harper Center 455
E-mail: ruey.tsay@chicagobooth.edu

Grading:
Mid-term (40%), Final project (40%), and homework assignments (20%).

Special notes:

- Homework is due Before the class one week after being assigned.
- No late homework assignments will be accepted. Solutions or discussions will follow after the assignments are handed in.
- You may discuss assignments with each other, but must turn in your own answers.
- No e-mail submission of any assignment will be accepted.
- In class exam: Week 6, open book.
- Final project is due on Friday of Week 10 before 5:00 pm.
Computing:
The main software is R, especially the MTS package. R commands will be given when needed. See also the web page of the textbook. However, you may use any software of your choice.

**Course Outline:** All topics include applications

1. Transfer function models
2. Stationary vector autoregressive and moving average models
3. Estimation, modeling, and forecasting
4. Unit-root, co-integration and error-correction models
5. Principal component analysis, Diffusion index, and Factor models
6. Seasonal models
7. High-dimensional time series, including LASSO for dependent data and others
8. Multivariate volatility models
9. State-space model and Kalman filter if time permits

**ChicagoBooth Honor Code**
This course requires students to follow the Chicago Booth Honor Code and Standards of Scholarship in examination, final project and assignments. The Chicago Booth Honor Code requires students to sign the following pledge, “I pledge my honor that I have not violated the Honor Code during this examination.”, on every examination.