Instructor: Ivan Mendieta-Muñoz, Ph.D.  
Email: ivan.mendietamunoz@utah.edu  
Time: TuTh, 2:00 p.m. - 3:20 p.m.  
Place: M LI, 1735

Contact information:  
Office: Suite 4100, Office 4230, 260 Central Campus Drive, Gardner Commons.  
Phone number (Economics office): (+1) 801-581-7481.  
Consultation hours: Tu, 4:00 p.m. - 6:00 p.m.  
Personal website.  
University website.  

Course Page: Canvas

Prerequisites: ECON 7800; or an equivalent background.

This assumes that students have a working knowledge in econometric theory, matrix algebra and multivariate calculus.

Course Description and Objectives: This course concentrates on time series applications. Its primary purpose is to introduce you to a variety of state-of-the-art estimation techniques used in empirical macroeconometric research. Emphasis is on hands-on implementation of the methods covered in the course. Topics include linear and nonlinear univariate and multivariate time series models; financial time series analysis; state-space models; practical issues with likelihood-based inference; computational approaches to hypothesis testing and model comparison; forecast evaluation; and structural identification. Estimation techniques for panel time series may also be handled if the time permits. The course will equip students with the necessary knowledge to be able to undertake econometric analysis of the type commonly associated with modern macroeconomic research.

Textbook References:


Readings outside this text may also be assigned.

Students are also encouraged to keep up with current economic news. *Financial Times*, *New York Times* and *Wall Street Journal* are excellent sources and they are free on campus. You may also want to peruse *The Economist*. Additionally, an excellent website where you can find op-ed pieces by leading economists is *Project Syndicate*.

**Exams and Grading Policy:** The course grade will be based on three homework assignments; a final exam; and a final research paper submitted at the end of the semester. Therefore:

\[
\text{Homework Assignments (30%)} + \text{Final Exam (35%)} + \text{Final Research Paper (35%)}
\]

The final research paper needs to be an econometric project of the student’s own design. It could be an exercise in applying econometric techniques to some economic, social or financial issue amenable to empirical testing. It must be a time series application.

Your final report should be typewritten and follow conventional footnoting and bibliographic rules. It should be between 10 and 12 pages long, double-spaced. Papers more than 12 pages lose points. Your paper should briefly review the relevant literature. It should define measurable versions of the variables of interest and fit them into an econometric specification. It should apply appropriate estimation techniques, reporting the results clearly and concisely; and it should discuss the inferences that are justified from your results. Please do not include raw computer output.

There will be no make-up exams and late assignments will not get credit except in the cases of:

1. *Medical emergencies.*
2. *Officially sanctioned University activities.*

As indicated in PPM 9-7 Sec 15, the appropriate unit should provide a written statement for the reason of absence. In cases 2 and 3, students should get in touch with me at least one week before the exam and reschedule the examination. Students will not be assigned extra credit work to improve their grades. Senior class students’ work will not be graded differently.

Grading system follows the university standards:

• Excellent, superior performance: A (90-100%), A- (85-89.9%)
• Good performance: B+ (80-84.9%), B (75-79.9%), B- (70-74.9%)
• Standard performance: C+ (65-69.9%), C (60-64.4%), C- (55-59.9%)
• Substandard performance: D+ (50-54.9%), D (45-49.9%), D- (40-44.9%)
• Unsatisfactory performance: E (0-39.9%)
Important dates:

Homework Assignment #1 .................................................. Thursday, September 19
Fall Break ................................................................. Sunday-Sunday, October 6-13
Homework Assignment #2 .............................................. Tuesday, October 24
Homework Assignment #3 ............................................... Thursday, November 14
Discussion of Research Papers #1 .................................. Thursday, November 21
Discussion of Research Papers #2 ................................. Tuesday, November 26
Thanksgiving Break ....................................................... Thursday-Sunday, November 28-December 1
Revision Session ........................................................... Tuesday, December 3
Final Research Paper ..................................................... Tuesday, December 10
Final Exam ................................................................. Tuesday, December 10, 1:00 p.m. – 3:00 p.m.

Class Rules:

1. I encourage student cooperation in homework assignments. However, each student must present her own assignment. Duplication of the same assignment under different names is not acceptable and is considered cheating. Cheating in homework assignments or exams and other types of academic misconduct will be dealt with in accordance with the University regulations. Full details on procedures and penalties can be found here. Punishments can be severe, so don’t do it.

2. No electronic submissions will be accepted. You must hand in a hard copy of your assignments (either a manuscript or a printed document).

3. Come to class in time.

4. Read the assigned material in advance and familiarize with the subject before the lecture.

5. I will use Canvas for announcements, homework assignments, posting extra readings, etc. However, Canvas is not a substitute to attending class. It is your responsibility to keep up with the class.

6. Turn off your cell phones and remove them from your desk.

7. Do not believe any of the material you read in the textbook or elsewhere. Learn it well and critically.

8. Do not believe any of the material I present in class. Learn it well and critically.

Students with Disabilities: The Department of Economics at the University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you need accommodations in this class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services (162 A. Ray Olpin Student Union Building, 581-5020 (V/TDD)) to make arrangements for accommodations (more information can be found here).

Reminder: As the only institution in the state classified in the highest research category (R1), at the University of Utah you will have access to state-of-the-art research facilities and be able to be part of the knowledge creation process. You will have the opportunity to do research of your own with faculty who are leading experts in their field, engaging in programs that match your research
interests. Further, you will interact with and often take classes with graduate students that provide an advanced understanding of the knowledge in your field.

**Course Outline:** The following outline is approximate. We may slow down or speed up in accordance with the needs and demands of the class.

1. **Univariate Time Series Analysis**
   (a) Stationary Time Series Models
      - ARMA models
      - Stationarity, Invertibility and Ergodicity
      - The Autocovariance-Generating Function
      - Model Selection and Estimation
      - Principles of Forecasting
   (b) Non-Stationary Time Series
      - Trend and Difference Stationary Series
      - Unit Root Non-Stationarity Tests
      - ARIMA Models
      - Time Series Decomposition Methods

2. **Multivariate Time Series Analysis**
   (a) VAR Models
      - Model Selection and Estimation
      - Innovation Accounting and Granger Causality
      - Structural Identification: SVAR Models
   (b) VEC Models
      - Cointegration and Error Correction
      - Short-run and Long-run Dynamics
      - Estimation
      - Structural Identification: SVEC Models
   (c) ARDL Models

3. **Non-linear Time Series Models**
   (a) Non-Linearity in Econometric Models
   (b) Structural Change
   (c) TAR and STAR Models

4. **Financial Time Series Analysis**
   (a) Modeling Heteroskedasticity
   (b) ARCH and GARCH Models
5. **State-Space Models**

   (a) Specification
   
   (b) The Kalman filter and the Likelihood Function

   (c) Filtering and Smoothing

   (d) Estimation of Linear State-Space Models

   (e) TVP and MS Models