

ECON 7801. ECONOMETRICS II: ADVANCED MACROECONOMETRICS

Fall 2023

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Time: MoWe, 1:25 p.m. — 2:45 p.m.
Place: GC 1770

Contact information

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Consultation hours: Mondays, 4:00 p.m. — 5:00 p.m. or by appointment

[Personal website](#)

[University website](#)

Course Page

[Canvas](#)

Prerequisites

ECON 4020; ECON 6620; ECON 6630 or ECON 7800 or an equivalent background.

This assumes that students have a working knowledge in macroeconomic and econometric theory, and statistical inference (either classical or Bayesian).

Course Description and Objectives

This course concentrates on time series and empirical macroeconomic applications. 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. Emphasis is on hands-on implementation of the methods covered in the course. Topics include linear and nonlinear univariate and multivariate time series models and methods; computational approaches to model comparison; structural identification; and state-space models. We will rely mainly on Bayesian methods for statistical analysis. This course will make extensive use of two statistical programs, Matlab and R, for all applied time series statistical analysis.

On successfully completing this course students will be able to:

1. Read intelligently macro-empirical research with a proper understanding of the underlying methodology of inference and identification strategies.
2. Conduct empirical research suitable for publication in an economics or econometrics journal.
3. Become confident in learning novel macro-econometric techniques.
4. Understand the conditions under which particular time series estimators and methods are appropriate.

Learning Outcomes

1. *Inquiry and Analysis:* Empirical macroeconomics and econometrics are contentious disciplines since there are competing theories. This course will discuss models and methods to understand relationships between aggregate economic variables, investigate alternative theoretical chains of causation, and examine empirical evidence for competing hypotheses.
2. *Critical Thinking:* The emphasis will be on how to set up empirical models for suitable macroeconomic analysis and to obtain logical conclusions from them.

3. *Quantitative Literacy*: Students will also develop quantitative skills that will allow them to understand logical and numerical relationships between macroeconomic variables.

Main Textbook References

- Blake, Andrew and Mumtaz, Haroon (2019). *Applied Bayesian Econometrics for Central Bankers*. London: Bank of England, Centre for Central Banking Studies.
- Chan, Joshua, Koop, Gary, Poirier, Dale J. and Tobias, Justin L. (2020). *Bayesian Econometric Methods*. Cambridge: Cambridge University Press. 2nd Edition.
- Enders, Walters (2015). *Applied Econometric Time Series*. New York: Wiley. 4th Edition.
- Koop, Gary (2003). *Bayesian Econometrics*. Chichester: Wiley.

Additional Textbook References

- Durbin, James and Koopman, Siem J. (2012). *Time Series Analysis by State Space Methods*. Oxford: Oxford Statistical Science Series. 2nd Edition.
- Favero, Carlo (2001). *Applied Macroeconometrics*. Oxford: Oxford University Press.
- Hamilton, James (1994). *Time Series Analysis*. Princeton: Princeton University Press.
- Kim, Chang-Jim and Nelson, Charles R. (1999). *State-space Models with Regime Switching. Classical and Gibbs sampling Approaches with Applications*. Cambridge: The MIT Press.
- Lütkepohl, Helmut (2005). *New Introduction to Multiple Time Series Analysis*. Berlin: Springer.
- Shumway, Robert H. and Stoffer, David S. (2017). *Time Series Analysis and its Applications. With R Examples*. Cham: Springer. 4th Edition.
- Stock, James and Watson, Mark (2015). *Introduction to Econometrics*. Westford: Pearson. 3rd Edition.

Required Software

- Download Matlab [here](#)
- Download R [here](#) and RStudio [here](#)

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*.

Course Requirements

The lectures combine only the key points of each of the chapters, so it is important that you follow the reading assignments for each class.

University Policies

1. **The Americans with Disabilities Act**. 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](#)). All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

2. **University Safety.** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. More information regarding safety and to view available training resources (including helpful videos) can be found [here](#).
3. **Addressing Sexual Misconduct.** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).
4. **Undocumented Student Support.** Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit the [Dream Center website](#).

Grading Policy

The course grade will be based on attendance, two in-class research presentations, one mid-term research progress report, and a final research paper:

$$\text{Attendance (10\%)} + \text{Research Presentations (30\%)} + \text{Mid-term Report (30\%)} + \text{Final Research Paper (30\%)}$$

Students have the right to not attend to 5 classes. If a student misses more than 5 classes, she won't receive the 10% associated with this component.

The in-class research presentations should be 10-15 minutes summary of: (i) your research progress before the fall break; and (ii) your preliminary and/or final results before the end of the term.

The mid-term research progress report must be a four-page summary of the student's own design. It should be double-spaced, typewritten, and follow conventional footnoting and bibliographic rules. It should also include a references page containing at least five references, two of which should be academic peer-reviewed articles. It should provide answers to the three following questions:

1. What research project I might be interested in developing by the end of the semester? Why do I believe that this project matters?
2. What academic literature has studied this problem? How did they do it? What are their main findings?
3. What is my main hypothesis?

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, preferably consisting of some type of time series or empirical macroeconomics application. It should be between 20 and 30 pages long, double-spaced. Papers more than 30 pages long lose points. Ideally, it should build on the mid-term research progress report. The paper should briefly review the relevant literature: at least five references, two of which should be academic peer-reviewed articles. It should define measurable versions of the variables of interest and fit them into the econometric specification. It should apply appropriate estimation techniques, report the results clearly and concisely, and it should discuss the inferences that are justified from the results. It should not include raw computer output.

Late assignments will not get credit except in the cases of:

1. *Medical emergencies.*
2. *Officially sanctioned University activities.*
3. *Religious obligations.*

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

Labor Day	Monday, September 4
Research Presentations #1	Monday, September 18
Research Presentations #1	Wednesday, September 20
Mid-term Report	Wednesday, October 4
Fall Break	Sunday-Sunday, October 8-15
Research Presentations #2	Monday, November 20
Research Presentations #2	Wednesday, November 22
Final Research Paper	Monday, December 11

Class Rules

1. I encourage student cooperation in the mid-term report and the final research project. 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. 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.

4. Come to class in time.
5. Read the assigned material in advance and familiarize with the subject before the lecture.
6. Turn off your cell phones and remove them from your desk.
7. Do not believe any of the economics and/or econometrics you read in the textbook or elsewhere. Learn it well and critically.
8. Do not believe any of the economics and/or econometrics I present in class. Learn it well and critically.

Course Outline

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

- *Lecture 1. Bayesian Econometrics: An Overview*
 - Bayesian estimation, inference and computation
 - * Normal model with known variance
 - * Normal model with unknown variance
 - Normal linear regression
 - * Markov chain Monte Carlo (MCMC) methods: Gibbs sampling and the Metropolis-Hastings algorithm
 - Chapters 1 through 5 of Koop (2003) and Chapters 1 through 10 of Chan et al. (2020)
- *Lecture 2. Univariate Time Series Models and Methods*
 - Reduced-form and structural equations
 - White noise (WN), moving average (MA), autoregressive (AR) and ARMA models
 - Gibbs sampling for linear regression with general covariance matrix
 - * Linear regression with t errors
 - * Linear regression with MA errors
 - Bayesian model comparison methods
 - Chapters 1 and 2 of Enders (2015), Chapter 1 of Blake and Mumtaz (2019), Chapter 6 of Koop (2003) and Chapters 11, 12 and 17 of Chan et al. (2020)
- *Lecture 3. Mixture models*
 - Scale mixture of normals
 - Finite mixture of normals
 - Chapter 15 of Chan et al. (2020) and Chapter 10 of Koop (2003)
- *Lecture 4. State Space Models*
 - Gibbs sampling for state space models
 - Unobserved components models
 - Noncentered parameterization
 - State space models with time-varying parameters (TVP)
 - Stochastic volatility (SV) models
 - Chapter 18 and 19 of Chan et al. (2020), Chapter 8 of Koop (2003) and Chapter 3 of Enders (2015)

- *Lecture 5. Multivariate Time Series Models and Methods*
 - Gibbs sampling for vector autoregressions (VAR) models
 - Threshold VAR (TVAR) and Markov switching VAR (MS-VAR) models
 - TVP-VAR models
 - TVP-VAR with SV (TVP-VAR-SV) models
 - Chapters 4 through 6 of Enders (2015), Chapter 20 of Chan et al. (2020) and Chapters 2, 3, 4, 5 and 7 of Blake and Mumtaz (2019)