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I. Overview:  
This course introduces students to time series methods and to the applications of these methods in political and social science. We will begin with defining key concepts of time series analysis and then move on to testing for the univariate characteristics of our data. We will cover regression models for stationary, non-stationary, and fractionally integrated data. We’ll spend a day on forecasting as well. We will also study some more advanced techniques in time series analysis including cointegration, error correction models, bounds approaches, ARCH, GARCH, and ARFIMA methods. We will also spend some time learning about methods for studying time-varying relationships such as repeated cross-sectional analysis and dynamic conditional correlations.

II. Computer Work  
We will be using Stata for most or all of the material. This is available to you through Western’s server. Although these methods can be studied in R, Stata has advantages for programming, especially as we get to the advanced topics later in the semester.

Most class materials, such as class notes, data sets and readings, will be put on OWL

III. Required and Recommended Texts  
Two books are required for the course:

Suzanna Linn, Matthew Lebo, and Clay Webb. *We’re working on it! A Practical Guide to Time Series Analysis*. I will share pdfs of chapters. LLW


Other good time series books:  


### IV. Course Requirements

Students are expected to do all the assigned reading and attend all classes.

Course evaluation will be based on:

- 3 graded assignments: 10% each.
- One paper: 40%.
- Final Exam: 30%

I strongly advise students to begin data collection very early in the semester. With a good data set in hand you can do some research on a substantive problem and by the time you analyze the data for a term paper you will have many key parts to a possible journal submission. **Appropriate data sets for the final paper will have more than 60 timepoints and have time series aspects worth studying.** For example, the following *are not good* for what we will be learning: a few panels of individual-level data; 20-30 waves of a repeated cross-sectional dataset like the cumulative NES, or the GSS; very short time series. Think of long time series that can be explained by other long time series.

### V. Class Schedule and Readings

(note: some tweaking of this will be done)

Read before the class for which these are assigned.

**Class 1 September 12th**

**Topic:** Introduction to the course and review of time series fundamentals

- Notation and terminology
- Autoregression, autocorrelation and serial correlation
- Stationarity
- Exogeneity
- Weak dependence
- Trending, cycling and structural breaks
- Instability and integration

**Readings:**

LLW, Chapters 1 & 2.


**Class 2 September 19th**

**Topic:** Testing for autocorrelation, integration, stationarity, and testing.

**Reading:**

LLW Chapters 2 and 3.

BFHP – Chapter 2.
Class 3 September 26th Topic: Exogeneity
Reading:
LLW Chapter 4

Reading:
LLW Chapter 5
BFHP – Chapter 3.

Class 5 October 10th Topic: The ADL and the GECM
Readings:
Matthew Lebo, Patrick Kraft, and Ellen Key. 2022. “Cointegration testing with the GECM” Political Science Research Methods.
Recommended:

Class 6 October 17th Topic: Unit Roots, Cointegration, and Error Correction Models.
Reading:
LLW Chapter 6.
BFHP – Chapter 5-6.
Recommended:

Class 7: October 24th Topic: Near Integration, Fractional Integration, and Fractional Cointegration.
Reading:
BFHP Chapter 7.
Enders. Chapter 4.
in Britain. *British Journal of Political Science* 33:283-301.


**Recommended:**


**Class 8: November 7th Topic: Bounds Approaches to Inference with Time Series**

**Readings:**
LLW Chapter 7.


Philips, Andrew Q. 2018. “Have your cake and eat it too? Cointegration and dynamic inference from autoregressive distributed lag models.”


**Class 9 November 14th Topic: Time Series Regression Models and Election Forecasting**

**Reading:**
Time Series Regression Models:
Gujarati 17.
Hamilton 8-9.


Forecasting:
BFHP Second half of Chapter 7


**Recommended:**
Pindyk and Rubenfeld, Sections 6.2 and 9.1.

**Class 10 November 21st Topic: Vector Autoregression, Exogeneity, Granger Causality, and Seemingly Unrelated Regressions**

**Reading:**
BFHP – Chapter 4.

**Recommended:**


Class 11 November 28th Topic: ARCH, GARCH, and Dynamic Conditional Correlations.
Reading:
Recommended:
Gujarati, Chapter 12.

Class 12 December 5th Topic: Pooled Cross-Sectional Time Series, Rolling Cross-Sectional Models, Messy PCSTS, and MLMs
Reading:
Recommended Reading:

VII. Academic Integrity:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report and suspected instances of academic dishonesty.