

ECO 750X: TIME SERIES

Fall 2022

Mon-Wed, 11:00am-12:15pm

Bryan 456

Instructor: Prof. Matthew Schaffer

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Office Hours: Mon-Wed from 12:30 – 1:30 pm, or by appointment

Course Description: This course is an introduction to graduate level time series econometrics. The goal of the course is to provide students with a foundation in time series methods that can be applied in high level empirical research. There will be a roughly equal focus on theoretical topics and applications. The topics of the course include time series regressions, univariate stationary time series models (ARMA models), univariate and non-stationary time series models (trending data, unit roots), and multivariate models (VAR, error-correction).

Class Materials:

- Lecture notes will be posted on the class Canvas page. These notes are for class use only and should not be shared or distributed elsewhere.
- *Applied Econometric Time Series* (4th edition) by Walter Enders is a recommended reference text but purchasing it is not required.
 - Two other useful references are: *Time Series Analysis* by James D. Hamilton and *Introductory Econometrics: A Modern Approach* by Jeffrey M. Wooldridge
- Students will need access to a statistical software package of their choice (e.g., Matlab, R, Stata, SAS, etc.).

Course Objectives: By the end of the course students should have a theoretical understanding and practical proficiency with the most commonly used time series methods, including:

- Time series regression
- ARMA models
- ARCH and GARCH models
- VAR models
- Error-correction models

Exams and Grade Composition:

There will be four problem sets and two exams. The course grade is determined as follows:

40%: Problem sets

30%: Midterm Exam

30%: Final Exam

Students are welcome to work on the problem sets together, but each student must turn in their own assignment. Exams will take place in class and must be completed individually. No makeup exams will be offered.

Preliminary Course Outline (subject to change):

1. Introduction to Time Series Analysis
 - a. Historical Development
 - b. Review of Classic Regression
 - c. Regression with Time Series
2. Difference Equations
 - a. Time Series Models
 - b. Difference Equations and Their Solutions
 - c. Lag Operators and Notation
3. Stationary Time Series Models
 - a. ARMA Models
 - b. Stationarity
 - c. The Autocorrelation Function
4. Modeling Volatility
 - a. ARCH and GARCH Processes
 - b. Maximum Likelihood Estimation of GARCH Models
5. Models with Trend
 - a. Deterministic and Stochastic Trends
 - b. Unit Roots and Regression Residuals
 - c. Dickey-Fuller Tests
6. Multiequation Time Series Models
 - a. Vector Autoregression
 - b. Impulse Response Functions
 - c. Structural Decompositions
7. Cointegration and Error-Correction Models
 - a. Cointegration
 - b. Error-Correction and ADL Tests
8. Nonlinear Models and Breaks
 - a. Testing for Nonlinearity
 - b. Threshold Autoregressive Models
 - c. Smooth Transition Models

Academic Integrity: Students are expected to know and abide by the [UNCG Academic Integrity Policy](#). Violations will be pursued in accordance with the Policy. Bryan School Faculty and Student Guidelines can be found at <https://bryan.uncg.edu/wp-content/uploads/2017/08/faculty-and-student-guidelines-2018.pdf>.

Covid-19: As we return for Fall 2022, all students, faculty, and staff and all visitors to campus are required to uphold UNCG's culture of care by actively engaging in behaviors that limit the spread of COVID-19. While face-coverings are optional in most areas on campus, individuals are encouraged to wear masks. All individuals and visitors to campus are asked to follow the following actions:

Engaging in proper hand-washing hygiene.

Self-monitoring for symptoms of COVID-19.

Staying home when ill.

Complying with directions from health care providers or public health officials to quarantine or isolate if ill or exposed to someone who is ill.

Completing a self-report when experiencing COVID-19 symptoms, testing positive for COVID-19, or being identified as a close contact of someone who has tested positive.

Staying informed about the University's policies and announcements via the COVID-19 website.

Students who are ill, quarantining, or isolating should not attend in-person class meetings, but should instead contact their instructor(s) so alternative arrangements for learning and the submission of assignments can be made where possible.

As we continue to manage COVID-19 on our campus, we are following the lead of the local health department and we will adjust our plans to balance student success, instructional requirements, and the hallmarks of the collegiate experience with the safety and wellbeing of our campus **community**.