NYU TANDON SCHOOL OF ENGINEERING
Finance & Risk Engineering

# FRE-GY 6351,
# Econometrics and Time Series Analysis

## Instructor Information


- Dr. David Rios, Adjunct Professor
- Dr29@nyu.edu


## Course Information

- FRE-GY 6351
- Econometrics and Time Series Analysis
- An introduction to time series
- Statistics
- Seven sequential Thursdays starting with Oct 28
- 5:30pm to 8:11 pm Tue, Rogers Hall Rm 503

## Course Overview and Goals

Time series begins where linear regression ends. We explore modeling data where the future is influenced both the present and past results. Our main focus is understanding when we can apply and how to apply Auto Regressive and Moving Average models. ARMA for short.
The course will end with students presenting projects where the methods we learned are applied to real world data.

### Upon completion of this course, students will be able to:

- Decomposing a generic time series into stationary and non-stationary parts
- A practical understanding of ARMA time series models
- An introduction to spectral and GARCH models

## Course Requirements

### Class Participation

Students are strongly encouraged to ask questions during class

## Assignments

5-6 brief homework assignments based on the material we covered in class. The homework is more math based.

## Final Project

Group project / presentation applying the techniques we learned to real world data. The project students are encouraged to use R or Python as they see fit.

## Assigned Readings

Textbook readings will be assigned. In addition, a set of (hopefully) simplified notes is provided.

## Grading of Assignments

The grade for this course will be determined according to the following formula:

| Assignments/Activities | % of Final Grade |
|---|---|
| Homework | 40% |
| Project | 60% |

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# Course Schedule

## Topics and Assignments

| Week/Date | Topic | Reading | Assignment Due |
|---|---|---|---|
| Nov 2, 2021 | Introduction to time series | Davis 1.1-1.4 or Shumway 1.1-1.6 | Nov 7, 2021 |
| Nov 9, 2021 | Trends and seasonality | Davis 1.5, 3.1 or Shumway 1.7, 1.8, 2.2 | Nov 15, 2021 |
| Nov 16, 2021 | MA,AR, ARMA, Model ACF | Davis 3.1-3.3 or Shumway 2.2-2.4 | Nov 29, 2021 |
| Nov 30, 2021 | PACF / Forecasting | Davis 2.5 Shumway 2.5 | Dec 6, 2021 |
| Dec 7, 2021 | Estimation | Davis 5.1 Shumway 2.6 | Dec 13, 2021 |
| Dec 14, 2021 | GARCH and Spectral Models | GARCH : Tsay Spectral :Shumway 4.1-4.3 | TBD |
| Dec 21, 2021 | Student Presentations | NA | Dec 22, 2021 |

# Course Materials

## Recommended Textbooks & Materials

- Introduction to Time Series and Forecasting, Brockwll & Davis
- Time Series Analysis and its Applications, Shumway & Stoffer
- Analysis of Financial Time Series, Tsay

## Resources

- **Access your course materials**: NYU Classes (nyu.edu/its/classes)
- **Databases, journal articles, and more**: Bern Dibner Library (library.nyu.edu)
  NYU Virtual Business Library (guides.nyu.edu/vbl)
- **Obtain 24/7 technology assistance:** Tandon IT Help Desk (soehelpdesk@nyu.edu, 646.997.3123)
  NYU IT Service Desk (AskIT@nyu.edu, 212-998-3333)

# Policies

## Academic Misconduct

A. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:

   1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam

for you or taking an exam for someone else; violating other rules governing the administration of examinations.
2. Fabrication: including but not limited to, falsifying experimental data and/or citations.
3. Plagiarism: Intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
4. Unauthorized collaboration: working together on work that was meant to be done individually.
5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission have been received from the course instructor(s) or research adviser involved.
6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

## Disability Disclosure Statement

Academic accommodations are available for students with disabilities. Please contact the **Moses Center for Students with Disabilities** (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.

## Inclusion Statement

The NYU Tandon School values an inclusive and equitable environment for all our students. I hope to foster a sense of community in this class and consider it a place where individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities will be treated with respect. It is my intent that all students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. If this standard is not being upheld, please feel free to speak with me.