Economic & Business Forecasting
Econ 178, Winter 2019

Course description: The increasing complexity and the uncertainty of global markets are fueling the demand for professional experts who possess an understanding of forecasting, statistical tools to solve forecasting problems, and necessary computer skills to create relevant forecasts. This economic and business forecasting class combines the essential tools in economics, statistics, and mathematics to meet these growing needs. In particular, students will be taught the formal procedures of identifying and understanding characteristics of time series and financial data, and the skills for developing and analyzing models for forecasting time series data. Furthermore, we will discuss "real-world" applications for modeling and evaluating forecasts upon which decision-making would depend. Substantial emphasis will also be placed on efficient and effective use of a programming language, R. Also assignments require the use of R.

Learning objectives:

1. The goal is to learn enough theory and get enough practice to be able to do some simple but sensible forecasting on your own.
2. The students should obtain the skills for basic forecasting analysis with real data.
3. The students will develop a working knowledge of R, a programming language and software environment for statistical data analysis.

Prerequisites: Econ 120C. Concurrent enrollment in Econ 120C is permitted.

Required textbook: Gloria Gonzalez-Rivera, *Forecasting for Economics and Business*, 1st Edition, Routledge.

- The UC San Diego Bookstore provides the digital format (ebook) of the textbook through TritonEd and is free for the two weeks of classes. After two weeks, your student account will be charged a special reduced price unless you opt-out of the content.
  - To opt out click the RedShelf link inside TritonEd and follow the opt-out prompt, you must opt out by Jan. 19. Click here to view how to access your ebook or opt out.

R & RStudio: R is a scripting language for statistical data manipulation and analysis. R is freely available under the GNU General Public License, and pre-compiled binary versions are provided for various operating systems. You can download this program from `http://www.r-project.org`. RStudio is a powerful and productive user interface for R. You can find this program at `http://www.rstudio.com`.

You are required to familiarize yourself with R, without losing focus on the main material in the course. I plan to do in-class demonstrations on the use of the language. If you are strongly inclined, you may (after consulting with me) use any other software or language you want, provided that it performs the necessary calculations. Any problems arising from this decision, however, are the responsibility of the student.

Lectures: Tuesday and Thursday

- section A00: 11:00am - 12:20pm @ Mandeville Center B-210
- section B00: 12:30pm - 1:50pm @ Peterson Hall 102

Instructor: Dr. Munpyung O

- Office: Economics 109
- Office hours: 3:00pm – 4:00pm on Tuesdays, 9:30am – 10:30am on Thursday, and by appointment.
- e-mail: munpyung@ucsd.edu

  Please use your **UCSD email** and include "**Econ 178**" in the subject line of your email. The professors and TA will respond to **thoughtful** emails. We cannot answer all the questions through emails since some questions are hard to answer through emails.

Teaching Assistants and office hours (TBA):

- Nguyen, Lam, @ SH 234, lhn022@ucsd.edu
- Viviano, Davide, @ SH 207, dviviano@ucsd.edu

Reader: Bechler, Christian and Dwyer, Holt

Course web page: A course webpage is available at `http://tritoned.ucsd.edu`. It will include information relevant to the course, such as syllabus, problem sets, data sets, R-scripts and more. **You should check this page regularly**.

Course gmail for questions: If you have questions, please use the course Gmail, ucsdecon178@gmail.com

Lecture slides: I have created my lecture slides for my own use, not for distribution. These are very far from a complete record of what I say in class. By themselves, they will be insufficient for keeping up with the course. Rather, the slides will serve as an outline for developing the concepts in each lecture while still requiring active learning (attending lectures, taking notes, and asking questions).

- I will post my lecture slides **AFTER** finishing a chapter or a topic.
- It is not completed or polished and cannot be a substitute for my lectures. These are just lecture slides and undoubtedly contain errors. **Many details, derivations, and examples are left out**.
- A nontrivial fraction of the exam questions could be based on class discussion and examples which are uncovered in the lecture slides.
- The slides are a cut-down version of the full lecture and won't contain all the details that the live version possesses. Again, the lecture slides cannot be a substitute for my lecture. **Without attending the lecture, you will not understand my lecture slides**.

Problem Sets: I will periodically assign problem sets throughout the course. Some of them will be graded. It is VERY important to do them by yourself. The problem sets are the best way to learn and be prepared for the exams.

Exams: The out of class midterm will be given during 8:00 pm - 9:20 pm on Tuesday, February 12. The location will be announced. The final for the section A00 will be given during 11:30 am - 2:30 pm on Thursday, March 21 and during 11:30 am - 2:30 pm on Tuesday, March 19 for the section B00. **You have to take your final exam in the registered section**. The dates for the exams are not negotiable. If you have a conflict with the scheduled tests, it is your responsibility to drop the course. The final exam will be cumulative but focus more on the material covered after the midterms. All tests are closed book and notes.

Makeup exams will be given only under very unusual circumstances and only if the student provides official written notification to the instructor no less than two weeks prior to the missed test. If you miss a midterm for a **justifiable** and **verifiable** reason, your midterm grade will be your grade on the final. Students who miss a test without a justifiable and verifiable reason will most likely fail the course. No exceptions!

Grades: The overall score will be computed as follows:

- Problem sets: 15%
- Midterm: 35%
- A comprehensive final: 50%

The overall course grade, computed using the weights specified above, will be curved.

I reserve the right to modify these weights as needed during the quarter.

Disability: If you have a documented disability, please bring your documentation to me as soon as possible so that I can make suitable accommodations for you. If you believe that you have a disability and desire accommodation, please register with the Office for Students with Disabilities.

Class conduct: Each student is expected to contribute and help to maintain a positive classroom environment conducive to learning. Do not socialize or read newspapers during class, and be sure your cell phones are turned off. No text messaging is allowed. If you must arrive late or leave early, do so quietly.

Academic Integrity: Any student found responsible for violating UCSD's academic integrity policy will earn a failing grade for the course. In addition, the Council of Deans of Student Affairs will impose a disciplinary penalty. You can find information on the university's policy on academic integrity at this website: http://academicintegrity.ucsd.edu

General comments

- Even if I don't explicitly assign reading from the text, it is a good idea to read the chapter before coming to class in order to have some understanding of the concepts to be presented.

- ***This class moves rapidly***. *Cramming* is not an effective way to learn this material. A student who keeps up with the topics as they presented will find the course much more enjoyable and will master the concepts more quickly.
- **Attend all lectures**. You are responsible for any information given during lectures.
- The best way to learn is by doing. The problem sets are designed to get you to practice the material introduced in the lectures.
- Please do use my office hours for everything related to the content of the course. If you have doubts about the materials, do not wait until a few hours before the exam.
- Students are encouraged to ask questions in class. You've probably heard this before, but if you have a question, chances are that others in the class have the same question.
- Finally, ask questions before, during, or after class or come to my office if you having any trouble with the course material. Remember the goal of education is to learn, not to suffer!

Course content and schedule (Changes, if any, will be announced in the class.)

The following course schedule should be considered **extremely** tentative, and will likely change depending on our pace through the quarter. I reserve the right to modify this schedule as needed during the quarter. Not all topics will be covered in the same detail. Time constraints may cause some topics to be omitted.

1. Introduction (chapter 1)
    - Time series and financial data
    - Forecasting Methods: Overview
2. Modeling and Forecasting Cycles: ARIMA models
    - Basic concepts and tools (chapter 3 and 4)
    - Forecast with ARIMA (chapter 6 and 7)
    - Model selection (chapter 8)
3. Time-Series Decomposition: Trend and Seasonality (chapter 10)
    - Modeling and Forecasting trend
    - Modeling and Forecasting seasonality
    * US census X-12-ARIMA
    - Putting it all together: A forecasting model with trend, seasonal, and cyclical components.
4. Unit roots, Stochastic trends, and Smoothing (chapter 10)

*5. Modeling and Forecasting Volatility (chapter 13, 14)
    - Characteristics of financial data
    - ARCH and GARCH models: Estimation and Forecasting
    - Extensions of ARCH and GARCH models

*6. VAR models: Concepts and examples only (chapter 11)