

**University of Maryland**  
**Master of Professional Studies in Applied Economics**  
**1400 16<sup>th</sup> St. NW, Suite 140, Washington, DC**  
**Syllabus for ECON 684: Applied Time Series Analysis and Forecasting, Summer 2018**

**Administrative**

*\*\*You are responsible for reading this syllabus in detail \*\**

Professor: Thiago Ferreira, Ph.D.

Email: [revilth@gmail.com](mailto:revilth@gmail.com)

Class time: Mondays 6:45 pm – 9:30 pm. (There will be a 15 minute break each class at some point between 7:45 and 8:30).

Office hours: 30 minutes before class every Monday evening, and by appointment.

**Note: The first 2 meetings will be on Friday, June 8<sup>th</sup> and Friday June 15<sup>th</sup>, rather than on Monday May 29<sup>th</sup> and Monday June 4<sup>th</sup>. The last meeting will be on Monday, August 20<sup>th</sup>. See Class Schedule below.**

Teaching Assistant: Shanxiao Wang

Email: [WangS@econ.umd.edu](mailto:WangS@econ.umd.edu)

Office Hours: Every Monday from 5:00-6:30

Course Website: Copies of the course syllabus, your grades, and other relevant links and documents will be posted on the course's ELMS/Canvas website. You can access the site via [www.elms.umd.edu](http://www.elms.umd.edu). You will need to use your University of Maryland "directory ID" and password.

**NOTES:**

*The University has adopted email as the primary means of communication outside the classroom, and I will use it to inform you of important announcements. Students are responsible for updating their current email address via <http://www.testudo.umd.edu/apps/saddr/> AND for paying attention to messages I send to the class. Failure to check email, errors in forwarding email, and returned email due to "mailbox full" or "user unknown" will not excuse a student from missing announcements or deadlines.*

*If you require any type of special accommodations, please let me know by no later than the end of the second class so that there is sufficient time to plan ahead for your needs.*

## Prerequisites

Econ 642 and Econ 645.

## General Description and Overview

This course builds on the brief introduction to time series econometrics offered in ECON 645. Students will learn the theory of stationary and nonstationary processes and how this theory applies to econometric techniques for estimation and forecasting based using time series data. The techniques will be applied in macroeconomic, financial, and business applications. More specifically, the topics covered include, among others, autoregressive-moving average processes, filters, vector autoregression models, and non-stationary time series analysis. Time permitting, in the last class, I will also cover recent developments in time series that solve some of the problems with the frameworks discussed over the term.

***You are enrolled in an applied Master's program. Accordingly, we will delve into the theory of time series, but we will focus the majority of our attention on the application of this theory to data analysis, particularly so by engaging in extensive use of Stata. This class is to the greatest extent possible self-contained, so as far as time series goes, I will be teaching you everything you need to know for doing well in this class from the ground up.***

This last statement applies, in particular, to the software we will be using throughout the class: Stata. We will build on your prior knowledge of Stata and extend it to incorporate specialized tools ***in order for you to achieve the applied time series knowledge that professional economists use in practice.***

Our program has 7 general learning outcomes for students:

1. Ability to understand, evaluate and analyze economic data
2. Ability to understand and interpret statistical evidence from economic data
3. Ability to apply empirical evidence to assessing economic arguments
4. Ability to apply macroeconomic theories to policy discussions
5. Ability to apply microeconomic theories to policy discussions
6. Ability to communicate economic ideas to a broader audience
7. Ability to evaluate the effectiveness of policy programs using sound economic techniques

The learning outcomes that pertain to this course are: *1, 2, 3, 4, and 6.*

## Methodology and (No Required) Textbook

There is no required textbook for this course (because there is no particularly good textbook out there that is suitable for an applied class like this one). Instead, we will interactively develop lecture notes in class, and these lecture notes are all that you will need in order to do well in the class. In order to facilitate this interactive development, for most classes, I will provide you with lecture notes and during class we will enhance these lecture notes jointly. **When used, lecture notes will be posted on ELMS as the class moves along.** Of note, the joint development of these lecture notes involves heavy usage and learning of Stata as applied to time series. ***So, be prepared to spend good chunks of class working with Stata in real time rather than writing down equations.***

### **Grading and Related Issues**

You will be evaluated on the basis of: (1.) weekly online discussions; (2.) three quizzes; (3.) one problem set and (4.) a final exam. Your final numerical grade in the class is a weighted sum of the preceding components, each of which totals 100 points in itself. As explained below, there will be one opportunity for extra-credit. Final numerical grades will then be curved in order to assign final letter grades.

Quizzes, problem set and final exam are cumulative in terms of the material they cover. Quizzes will be designed to take 30 to 45 minutes and their exact timing will be determined by the flow of the class. The final exam will be designed to take about 2 hours, although you will be welcome to have the full class time for solving this exams. All quizzes and the final exam are subject to include analytical (that is, pen and paper) exercises, and applied components (that is, using Stata). Analytical components will be tested closed notes, but applied components will be tested open notes.

Although I will not assign letter grades to individual class components, I will circulate key statistics of the distribution of grades of each assignment. Thus, for instance, I will make public the max, min and some percentiles of the distribution of grades of each quiz.

*Extra Credit.* Near the end of the term, you will receive an email inviting you to submit a voluntary and anonymous course evaluation. Your feedback on courses will be very helpful in improving the quality of instruction in our program. As an extra incentive for you to evaluate the course, in the final exam I will offer an extra credit opportunity to the whole class if the course evaluation response rate exceeds 80%. I will not be able to see which students have evaluated the course, nor anyone's explicit evaluation, but we will all be able to see the overall response rate.

At the end of the term, every student will have a numerical course grade between 0 and 100. Your final numerical course grade is calculated as follows:

1. Online discussion grade: 20%.
  - a. For each online discussion you will earn a grade between 0 and 100. Your final online discussion grade is a simple average of your online discussion grades throughout each discussion of the semester. People who do not contribute anything of merit will get zeros. People who make insightful and constructive contributions will get 100.
2. In-class quizzes (3): 12.5% each
  - a. Each quiz will be worth 100 points.
3. Problem set: 12.5%
  - a. It will be worth 100 points.
4. Final exam: 30%
  - a. It will be initially worth 100 points.

Extra-credit:

5. If the response rate to course evaluations exceeds 80%, then there will be an extra credit question in the final exam worth 5 points to be added directly on your final grade. You will be notified in a timely fashion whether or not the extra credit opportunity will be available.

I will decide upon the numerical cutoffs between various letter grades based on my professional judgement. I will consider students' performance relative to the class. I will also consider absolute standards of professional competence. Highly competent students will get A's. Barely competent students will get B's. Incompetent students will get B-'s or worse. The cutoffs that I use will respect the ordinal ranking of numerical course grades. No student with a given numerical course grade will receive a lower letter grade than someone else with a lower numerical course grade.

## Class Schedule

~~Monday, June 4:~~ Class 1. (Basics of time series analysis.)

Friday, June 8, Class 1, (6:45pm-9:30pm)

~~Monday, June 11:~~ Class 2. (Filters.)

Friday, June 15, Class 2, (6:45pm-9:30pm)

Monday, June 18: Class 3. (Filters and Stata Examples)

- Quiz 1

Monday, June 25: Class 4 (Univariate time series)

Monday, July 2: Class 5. (Univariate time series)

Monday, July 9: Class 6. (Univariate time series and Stata Examples.)

- Quiz 2.

Monday, July 16: Class 7. (Univariate time series and forecasting, with Stata Examples.)

Monday, July 23: Class 8. (Multivariate time series: Vector Auto Regressions.)

Monday, July 30: Class 9. (Multivariate time series: Stata Examples)

- Problem Set deadline

Monday, August 6: Class 10. (Nonstationary time series.)

- Quiz 3.

Monday, August 13: Class 11. (Recent Developments in VARs)

Monday, August 20: Class 12.

- Final Exam.

## **Standard Policies for the Program and the University of Maryland**

**Contact Hours:** Three credit courses at the University of Maryland require a minimum amount of contact between instructors and students. Our courses' 12 weekly 3-hour meetings only satisfy 80% of the university's contact requirement. The other 20% is satisfied by weekly mandatory and graded online contact. In principle, the contact hours requirement could be satisfied by scheduling 3 additional 150-minute meetings per term, or 6 additional 75-minute meetings, or 10 additional 45-minute meetings. But in practice the contact hours requirement is satisfied by the weekly online discussions. The weekly online discussions are a more flexible way to ensure that our program's courses in DC provide the same level of student-instructor contact as the traditional 15-week, face-to-face, version of the same course when it is taught on campus in College Park.

**Work Load:** Mastering the material covered in this course requires a significant amount of work outside of class. Students should expect to spend more time outside of class than in class – typically at least twice as much time. The courses in our DC program are 12-week courses that cover all the same material as a traditional semester-long 3-credit course (15 weeks). The compressed schedule makes it possible to complete our degree in just 15 months if you take 2 courses each term. But the compressed schedule also implies an accelerated pace with an average of 25% more work per week in a given course ( $15/12 = 1.25$ ). The normal full-time load in a master's program is 3 courses per semester, or 6 courses per year. The weekly work load when taking 2 of our courses per term is equivalent to the load from 2.5 "normal" 15-week courses - so  $2.5/3.0=83\%$  of a full-time load. Students who take 2 courses per quarter in our program complete 8 courses per year. So over the course of a year, taking 2 courses per quarter in our program is equivalent to 133% of a full-time load ( $8/6 = 1.33$ ).

**Academic Integrity:** The University of Maryland has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards applicable to all undergraduate and graduate students, and you are responsible for upholding these standards as you complete assignments and take exams in this course. Please make yourself aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information see [www.studenthonorcouncil.umd.edu](http://www.studenthonorcouncil.umd.edu).

**Student Conduct:** Students are expected to treat each other with respect. Disruptive behavior of any kind will not be tolerated. Students who are unable to show civility to one another or myself will be referred to the Office of Student Conduct. You are expected to adhere to the Code of Student Conduct.

**Excused Absences:** The University of Maryland's policy on excused absences is posted here: <http://www.president.umd.edu/administration/policies/section-v-student-affairs/v-100g>

Please note:

If you miss any class meetings for any reason, you are still responsible for all material covered during the meeting you missed. It is your responsibility – not the instructor's – to get yourself caught up in the course. Instructors routinely facilitate things by posting lecture notes, etc.

If you need to miss an exam or other graded course requirement because of illness, injury, or some other emergency: Follow doctor's orders and get documentation. Get in touch with the instructor as soon as you're able – preferably prior to missing the exam or deadline. Communicate with the instructor to make up the course requirement as soon as possible. You are entitled to recover before you make up the course requirement, but you are not entitled to extra days to study beyond the time the doctor's note says you're incapacitated. If you are incapacitated for more than a week or so beyond the end of the term, your grade in the course will be an "Incomplete". In such cases you must negotiate a plan with your instructor for completing the course requirements. Once you make up the course requirement the instructor will change your "I" to the appropriate letter grade.

**School Closings and Delays:** Information regarding official University closing and delays can be found on the campus website and the snow phone line: (301) 405-SNOW (405-7669). Since our program is an evening program in downtown Washington, DC, rather than a day program in College Park, we do not always cancel classes on the same days as the College Park campus. The program director will always announce cancellation information to the program as an announcement on the program's ELMS/Canvas site. This will generally be done by 1:00 p.m. on days when weather or other factors are an issue.

**UMD Counseling Center:** Sometimes students experience academic, personal and/or emotional distress. The UMD Counseling Center in Shoemaker Hall provides comprehensive support services that promote personal, social, and academic success. The cost of these services is covered by the fees you already paid when you registered for classes, and there is no additional charge if you use the services. Proactively explore the range of services available, including the Counseling Service, Accessibility and Disability Service, Learning Assistance Service, and the Testing Office, all described at <http://www.counseling.umd.edu/>

**Students with Disabilities:** The University of Maryland does not discriminate based on differences in age, race, ethnicity, sex, religion, disability, sexual orientation, class, political affiliation, or national origin. Reasonable accommodations will be arranged for students with documented disabilities. Students who have an accommodations letter from the Accessibility and Disability Service (ADS) should meet with me during the first few weeks of the semester to discuss and plan for the implementation of your accommodations. If you require reasonable accommodations but have not yet registered with ADS, please contact the Accessibility and Disability Service at 301-314-7682 or [adsfrontdesk@umd.edu](mailto:adsfrontdesk@umd.edu).

**Academic Progress:** The graduate school requires that students maintain a GPA of at least 3.0. Students whose cumulative GPA falls below 3.0 will be placed on academic probation by the graduate school. Students on academic probation must ask the program's director to petition the graduate school if they want to remain in the program. The petition must include a plan for getting the student's GPA up to at least 3.0. Students who do not live up to their plan can have their enrollment in the program terminated without having earned the degree. Note: a grade of "B" corresponds to a GPA of 3.0. A grade of "B-" corresponds to a GPA of 2.7.

**Building Access:** The door to the building at 1400 16th Street is unlocked on weekdays until 7:00 p.m. Students who arrive after 7:00 p.m. or on weekends will find the door locked. The building's security guard is stationed at a desk just inside the door until 11:00 p.m. and will let you in. You can also call the phone on the security guard's desk by dialing (202) 328-5158. If the security guard is off duty or happens to be away from his or her desk when you arrive, you can pick up the black phone to the right of the door. You will be connected to the company that handles security for our building. If you tell them you are with the University of Maryland (1400 16th Street, suite 140), they should ask you for a

password. When you tell them the password, they will be able to buzz you in. If they are unable to buzz you in from 1400 16th Street for some reason, go around to the 1616 P Street door to be buzzed in. You can get the password from the program coordinator, the TA, or the program director.