Master of Professional Studies in Applied Economics  
University of Maryland  
1400 16th Street, NW, Suite 140, Washington, DC  
ECON 684: Applied Time Series and Forecasting  
Summer 2015

**Syllabus**  
Instructor: Francisco Vazquez-Grande, 202-573-8542 ([fvg@umd.edu](mailto:fvg@umd.edu))  
Office Hours: 30 minutes before class, and by appointment

Teaching Assistant: Burak Turkgulu ([MastersTA@econ.umd.edu](mailto:MastersTA@econ.umd.edu))  
Office Hours: TBA

Prerequisites:  
ECON 642 and ECON 645

Class meets: Tuesdays, 6:45-9:30 p.m.  
There will always be a 15-minute break sometime between 7:45 and 8:30.

**General Description and Overview**  
The course is a semester-long introduction to advanced time series econometrics and forecasting. There will be a rigorous treatment of stationary models, and an introduction to non-stationary models. We introduce fundamental concepts with univariate models, and then move on to multivariate models. Emphasis is on practical applications to analysis of financial markets and macroeconomic data.

**Course Objectives**  
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.

Students will become familiar with the contemporary time series analysis and forecasting, as practiced by professional economists in government agencies and the financial industry. Students will acquire working knowledge of time series data. We will study simple models and methods for analysis of business, macroeconomics and financial time series. Students will be gain expertise in the software to conduct this analysis. Students will investigate dependence between asset returns. Students will finish the course with a clear idea of the limitations of models and econometric analysis of financial time series.


**Other useful texts:**  

**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.
Schedule (revisions, if any, will be announced in class, by email, and posted in a revised syllabus online)
The class will meet on 12 consecutive Tuesdays nights from June 2-August 18.
There will be a 15-minute break at some point between 7:45 and 8:30.

I. Introduction (6/2/2015)
Tsay. Chapter 1

- Introduction to Time Series Data and Analysis
- Introduction to R
- Homework 1 (due on 6/9/2015)

II. Autocovariances and Linear Time Series Models (6/9/2015, 6/16/2015)
Tsay Ch 2

- Lag Operators, Linear Difference Equations, ARIMA Models
- Seasonal Models
- Unit roots
- Regression with Time-Series errors.
- Homework 2 (due on 6/16/2015)
- Homework 3 (due on 6/23/2015)

Tsay, Ch. 3

- Testing for heteroscedasticity
- GARCH and ARCH models
- Alternative Approaches to Estimating Volatility.
- Homework 5 (due on 7/14/2015)

IV. Nonlinear models 7/7/2015
Tsay Ch 4

- Regime Switching
- Neural Networks

MIDTERM (7/14/2015)

Tsay, Ch. 8, 10

- VAR(p) models, Impulse Response Functions
- Granger Causality. Cointegration
- Factor Models
- Homework 6 (due on 8/4/2014)

Tsay, Ch. 5, 7,10

- Models for High Frequency Data
- Value at Risk and extreme value theory
- Multivariate Volatility models

FINAL (8/18/2015)
Grades

The course grade will be based on weekly online discussions, 6 problem sets and a course project. The relative weight of these components in the course’s final grade are:

Weekly online discussions (5%)
6 Problem Sets (10%)
Midterm (30%)
Final (30%)

I will open on online discussion by midnight every week after class. I will begin one or more threads of the discussion with questions that follow from things that came up during class. The discussions will remain open for 24 hours. Students must post at least one – and no more than three – contribution(s) to an online discussion each week. I will check in once around mid-day, and once in the late afternoon/early evening to respond to what has been posted and to redirect the discussion as necessary. The online discussions will be graded according to a rubric that I will post on the course website.

The first problem set will test material covered in Roman numerals I. The 2nd and 3rd will test the material covered in Roman numerals II. The 4th, 5th and 6th will test material covered in Roman numerals III, IV and V respectively. Students are required to work individually on the problem sets. The problem sets are due before the beginning of the following class.

Exam
There will be two in class exams, a midterm and a final. The midterm will take place on July 7th and the final on August 18th. Both are open book and open notes.

Final Course Grades
At the end of the semester I will simply add up each student’s course points. This will be a number between 0 and 100. I do not grade on a curve. Numerical course grades will be translated into letter grades as follows:

<table>
<thead>
<tr>
<th>Numerical Grade</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100</td>
<td>A</td>
</tr>
<tr>
<td>90-92</td>
<td>A-</td>
</tr>
<tr>
<td>80-89</td>
<td>B+</td>
</tr>
<tr>
<td>70-79</td>
<td>B</td>
</tr>
<tr>
<td>60-69</td>
<td>B-</td>
</tr>
<tr>
<td>50-59</td>
<td>C+</td>
</tr>
<tr>
<td>40-49</td>
<td>C</td>
</tr>
<tr>
<td>30-39</td>
<td>C-</td>
</tr>
<tr>
<td>20-29</td>
<td>D+</td>
</tr>
<tr>
<td>10-19</td>
<td>D</td>
</tr>
<tr>
<td>0-9</td>
<td>F</td>
</tr>
</tbody>
</table>

I might give an A+ to a student or two at the very top of the class’ grade distribution.
Email: Email is 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 via ELMS. 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. I will do my best to respond to email within 36 hours.

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 usually satisfied by mandatory and graded online contact. Instructors have some discretion in how they structure the online component of their course. In principle, the contact hours requirement could also be satisfied by scheduling 3 additional 3-hour meetings per term, or one additional 45-minute meeting per week. The online components of our courses are a more flexible way to ensure that our program’s courses provide the same level of student-instructor contact as a traditional 15-week, face-to-face, 3-credit course at the University of Maryland.

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 program are 12-week courses that cover all the same material as a traditional semester-long 3-credit course. 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. If we’re going to cover all the same material as a traditional semester-long 3-credit masters-level course, we need to cover the material quickly.

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.

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.

Medical Excuses: 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.

If you need to miss an exam or other course deadline 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”. 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.
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, and national origin. Reasonable accommodations will be made to students with documented disabilities. I will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and who provide me with a University of Maryland DSS Accommodation form.

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 be forced to leave the program without having earned the degree.

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 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 at 1400 16th Street. You will be connected to the company that handles security for our building. If you tell them you are with the University of Maryland, they should ask you for a password. The password is “Drawbridge”. When you tell them the password, they will be able to unlock the door for you.