Econ 470 - Section 001
Computational Economics
Fall 2012

Instructor: Dr. Juergen Jung, Stephens Hall 101K, (410) 704-3551 (Economics Department: 410-704-2959), email: jjung@towson.edu

Time and Location: Tuesday / Thursday 11:00 a.m. - 12:15 p.m., Stephens Hall 207.

Office Hours: Stephens Hall 101K

Tuesday	1:00 p.m. - 2:00 p.m.
Thursday	3:30 p.m. - 4:30 p.m.

Course Website: http://pages.towson.edu/jjung/teaching.htm

Required Textbooks:

- Jones, Owen, Robert Maillardet, and Andrew Robinson (2009), *Introduction to Scientific Programming and Simulation Using R*, Chapman and Hall/CRC.

- Langtangen, Hans Petter (2011), *A Primer on Scientific Programming with Python*, Springer; 2nd Edition.

Highly recommended textbook:

- For students that lack the mathematical background: Dadkhah, Kamran (2011), *Foundations of Mathematical and Computational Economics*, Springer, 2nd Edition. (Matlab/Octave based)

- Rizzo, Maria L. (2008), *Statistical Computing with R*, Chapman & Hall/CRC. .

Recommended:

- Miranda, Mario J. and Paul L. Fackler (2002), *Applied Computational Economics and Finance*, MIT Press. (Matlab/Octave based)

- Relatively complex text for very advanced econ and math majors: Stachurski, John (2009), *Economic Dynamics - Theory and Computation*, MIT Press. (Python based)

- If you want to become more productive with Python: Langtangen, Hans Petter (2010), *Python Scripting for Computational Science*, Springer.

- For students interested in finance applications: John C. Hull (2012), Options, Futures, and Other Derivatives and DerivaGem CD Package, 8/E, Prentice Hall.

Requirements: You are expected to know basic economics, statistics, mathematics (incl. basic calculus). Drawing graphs and using a few equations to explain concepts should not be a new methodology for you. Also, words like scarcity, elasticity, marginal costs, marginal benefits, opportunity costs, supply, demand, and market equilibrium should be familiar. The course demands a fair amount of analytical thinking and independent problem solving.

Prior programming experience is advantageous but not required. You should own a computer since the many assignments will require a fair amount of independent (out of class) programming. We will use free (public domain) software packages that you can install on your personal computer. The software will run on Windows, Unix, and Apple OS.

Course prerequisites: ECON 201, Econ 202, Calculus, ECON 309, ECON 310. For math, physics, finance, and computer science majors only ECON 201, Econ 202, and Calculus are required.

Grading: There will be a homework due each week. If not otherwise indicated, the homework will be "uploaded" via Dropbox in the form of an R-Scriptfile and a separate Python scriptfile. They will count toward the final grade as follows.

Project (split into)		35%
Presentation I	5%	
Presentation II	5%	
Presentation III	5%	
Final presentation and paper	20%	
Homework		15%
Midterm exam		25%
Final exam		25%

The grading scale is as follows:

$92 - 100$		A
$90 -$	< 92	$A-$
$88 -$	< 90	$B+$
$82 -$	< 88	B
$80 -$	< 82	$B-$
$78 -$	< 80	$C+$
$71 -$	< 78	C
$68 -$	< 71	$D+$
$60 -$	< 68	D
< 60		F

Project: You are required to hand in a research paper. You will start working on this project in week 4 under my supervision, in teams of 2 students per team. You will have to present a progress report every 3 weeks in class - see the tentative time line on my website for the dates of these presentations. The topic for the project has to be either an Economics, Statistics, or Finance application. I will provide you with a small list of topics but encourage you to come up with your own. I will provide more details about the projects in class.

Exams: The midterm exam will be on **Tuesday, October 16**. It is a take home exam, that you have to submit two days later om **Thursday October 18 at 11 a.m.** via Dropbox.

The final exam is on **Monday, December 10.** It is a takehome exam that is due 2 days later on **Wednesday, 11 am** via Dropbox.

In general, make-up exams will NOT be given. If you are involved in a university sponsored event that conflicts with an exam you must notify the instructor at least one week prior to the exam to schedule an alternative exam time. Should you miss an exam without an excuse, you will receive a zero for the exam.

Student Evaluations: Student evaluations of this course play a crucial role in my delivery. This semester, all course evaluations will be administered online during the last two weeks of the course. You will receive an email with a link to the website with directions on how to access the survey. It is vitally important that you complete the survey as I use the results to modify the course and assess my teaching and the University uses the results to address technology and facility needs. You can be assured that your responses will be confidential as the results will be transmitted to me after the grading period and they will not include any identifying information.

No Cell-Phone Policy: When you come to class please turn off your cell phone and store it in your bag. If you use your cell phone in class it will negatively impact your grade.

Et Cetera: Students may not repeat a course more than once without prior permission of the Academic Standards Committee.

Students with Disabilities: In accordance with university policy, if you have a documented disability and require accommodations to obtain equal access in this course, please contact me at the beginning of the semester (first three weeks!!) and when given an assignment for which an accommodation is required. Students with disabilities must verify their eligibility through the Office of Disability Support Services (AD 232).

Course Withdrawal: Please note that the last day to drop the class is **Wedndesday, November 7.** Students dropping on or before this date will receive a "W" on their official transcript. Withdrawal after that date will require an assignment of a letter grade for the course.

Academic Integrity: All students are expected to abide by Towson University's policy on academic integrity. The policy is available online:
http://wwwnew.towson.edu/provost/resources/studentacademic.asp. I will pursue the maximum allowable penalty for any violation of academic honesty or integrity.

Description of the Course

As per the course catalog: "Analysis of advanced economic models using quantitative statistical and optimization tools." The course will be taught at the advanced undergraduate level with ECON 309, ECON 310 AND calculus as a prerequisite. In order to solve advanced economic models a certain level of mathematical rigor is required. Due to the applied and heavily quantitative nature of the course – students will use powerful computational tools to solve more realistic economic models than they have been previously exposed to – a basic understanding of typical models introduced in intermediate economics courses as well as their mathematical representation is crucial. The course then extends these models and demonstrates the necessity of quantitative methods in finding solutions in more complex ecnomic settings. The course also introduces numerical methods that are useful in statistics and finance and will provide some applications in the second part of the course.

By the end of the course, you should be able to effectively apply quantitative solution methods to a wide range of economic, financial, and statistical issues. The learned skills will be readily applicable out of classroom as all software is open source and platform independent. Teaching will emphasize problem solving skills. The course will be highly useful for students who plan to go to graduate school in either economics, business, finance or statistics as well as for students who plan to work in an environment that requires strong quantitative data/computational skills.
Course Structure: Tentative Outline [Subject to change].

The course is structured into three parts, the first is an introduction to the programming languages, the second introduces basic numeric procedures, and the third is an application part. Applications are from Statistics, Economics, and Finance. See the time line posted on the website for more details on course content.

Why should I take this class?

Fortune: Data Science is the hot new job
September 6, 2011
By David Smith

"An article in the September 5 issue of Fortune Magazine notes that despite the economy, companies are scrambling to hire data scientists:

Data scientists have been a fixture at online companies like Google (GOOG) and Amazon (AMZN) for years. But these days organizations as diverse as Wal-Mart (WMT) and Foursquare are hiring computer science experts who can analyze all their data and provide intelligence that leads to better business decisions or new products. At Bitly, the URL-shortening service, for example, chief scientist Hilary Mason is helping the company package some of its massive volume of data into a measurement tool that Bitly customers can use to track how their content is faring online.

The growth of data science is just another good reason to learn R. R is the tool of choice for many data scientists, and several R users will be presenting at the next data science conference, Strata NY 2011 (sponsored by Revolution Analytics). CNN Money: Data scientist: The hot new gig in tech " (This article was kindly contributed to R-bloggers by Revolutions.)

David Smith

January 16, 2012

"The TIOBE index ranks popularity of programming languages according to their prevalence on the web. Back in February last year, the R language had risen to #25 in the charts, overtaking both SAS and Matlab. Earlier this month, TIOBE published its annual rankings of programming language popularity for 2011 and R has risen once again: it now ranks #19 in overall language popularity – its highest ranking since entering the index in 2007. (Matlab is at #23, and SAS at #32.)

According to the TIOBE folks, S and S+ (which preceded R) are also on the list, though not in the top 50. Nonetheless, if you bundled S, S+ and R together, they would rank at #14." (This article was kindly contributed to R-bloggers by Revolutions.)