

**Econ 431 - Section 001**  
**Computational Economics**

SPRING 2016

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

**Time and Location:** Monday / Wednesday 3:30 p.m. - 4:45 p.m., Stephens Hall 200.

**Office Hours:** Stephens Hall 101K

Monday	2:00 p.m. - 3:00 p.m.
Wednesday	5:00 p.m. - 6:00 p.m.

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

**Recommended books:**

There are no textbooks required for this class. The course website will function as your textbook. However, depending on your learning style, the following books might be worth checking out.

- Langtangen, Hans Petter (2011), *A Primer on Scientific Programming with Python*, Springer, 2nd edition.
- McKinney, Wes (2013), *Python for Data Analysis*, OrReilly, 1st edition.
- The textbook for an introductory programming course at MIT is: Guttag, John, V. (2013), *Introduction to Compuation and Programming Using Python*, Revised and Expanded Edition, The MIT Press.
- Another introduction into programming textbook is: Shaw, Zed (2013), *Learn Python the Hard Way*, Addison-Wesley Professional, 3 edition
- For students that lack the mathematical background: Dadkhah, Kamran (2011), *Foundations of Mathematical and Computational Economics*, Springer, 2nd Edition. (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) Extensive online notes for Python and another programming language called Julia are available online for free at: <http://quant-econ.net/index.html>
- If you want to become more productive with Python: Langtangen, Hans Petter (2010), *Python Scripting for Computational Science*, Springer.

**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:** Your grade will depend on your effort. Effort is measured using the following assignments: homework, a project, a midterm and a final. In addition, attendance and how active and prepared you are in class will be taken into account. The assignments carry the following weights:

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

The grading scale follows:

92 – 100	<i>A</i>
90 – < 92	<i>A–</i>
88 – < 90	<i>B+</i>
82 – < 88	<i>B</i>
80 – < 82	<i>B–</i>
78 – < 80	<i>C+</i>
71 – < 78	<i>C</i>
68 – < 71	<i>D+</i>
60 – < 68	<i>D</i>
< 60	<i>F</i>

**Homework:** There will be a homework due each week. If not otherwise indicated, the homework will be “uploaded” via a shared Dropbox folder in the form of a Python scriptfile. Dropbox is a free cloud based hosting service. If you do not have an account yet, please create a free account at: <https://www.dropbox.com/>

**Project:** You are required to hand in a research paper. You will start working on this project in week 3 under my supervision, in teams of 2 students per team. You will have to present a progress report every couple 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 I encourage you to come up with your research topic. I will provide more details about the projects in class.

**Exams:**

	<b>Date</b>	<b>Time</b>	<b>Room</b>
Midterm	Monday, February 29 - Wednesday, March 2	2 days	take-home
Final	Monday, May 9, 10am - Wednesday, May 11, 12:15pm	2 days	take-home

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 two 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 **Monday, April 4**. 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: “Introduction to basic programming concepts and analysis of applied economic models using numerical methods.” 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 economic 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

The course is structured into three parts, the first is an introduction to the Python programming language, 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?

Read this article: <http://www.skilledup.com/articles/reasons-to-learn-python/>  
The gist of it is:

- Python is one of the most popular languages. The TIOBE index<sup>1</sup> ranks programming languages according to their prevalence on the web. Python currently ranks number 5 (up from 8 last year) and has become the most popular introductory programming language in US undergraduate programs.
- It will be your introduction to programming and data science.
- It will distinguish you on the job-market. Starting salaries for individuals with Python skills are high.
- It's fun!

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<sup>1</sup><http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>