**Econ 611 Computational Economics Fall 2019**

3 Credits

MW: 1200 – 1:15 PM

Barry Hall 272

Instructor: James Caton

Office Hours: Mon and Wed 11:00 AM – 11:50 PM

Thur: 1:00 – 2:00 PM

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**Course Description:**

This course teaches elementary programming skills that are required for economic computation.

Students are introduced to computational methods for economic modeling and data analysis. They will learn to manage and visualize economic data and learn to automate these processes. Students will create a library of elementary statistical functions and an OLS regression.

**Course Bulletin**

Economic computation for modeling, analysis, and data management, including an introduction of rudimentary elements of programming required for economic computation.

**Course Objectives:**

1. Students will develop understanding of and practice with computational methods.
2. Students will analyze data that is processed and/or generated using different computational models.

**Course Learning Outcomes:**

Upon successful completion of the course, students will be able to:

1. build elementary computational programs for economic analysis. (UPLO 5)
2. understand the general syntax and structure requierd for statistical programming. (UPLO 5)
3. retrieve, generate, and analyze economic data. (UPLO 5)
4. manage and transform large data sets. (UPLO 5)
5. build functions that interpret data using statistical equations. (UPLO 5)
6. efficiently create a variety of visualizations for economic data. (UPLO 5)
7. build an agent-based model. (UPLO 5)

**Course Prerequisites**:

Econ 201 or 202

Stat 330 or Stat 367

**Required Texts:**

Students will use a digital copy of *Learn Python for Economics and Statistics,* a text that I have created for the course. This will be available for free to students.

**Grading:**

Classroom Participation: 15%

Final Project: 30%

Project Presentation 15%

Homework 40%

**Extra Credit**

There will be opportunities for extra credit. The Center for the Study of Public Choice and Private Enterprise will hold lectures on October 4, October 17, and Novembr 7. To receive extra credit, you must sign an attendance sheet and complete a 1-page writeup (single spaced, Times New Roman 11 font, with one-inch margins) that discusses the content of the event and considers the implications of that content. Each writeup may be awarded up to 1% extra credit that will contribute to the overall class grade.

Be aware that there will be no special extra credit offered to help students to raise their grade. Only extra credit offered is adescribed above.

**Grades**

Between 90% and 99.99% A

Between 80% and 89.99% B

Between 70% and 79.99% C

60% and Less Than 69.99% D

Less Than 60% F

**Course Software:**

Python 3.0+

Anaconda (with Spyder)

**Homework:**

There will be a homework each week posted to the course Github account. Homework is to be submitted via email by the Sunday evening following the last week of the section (**see *Schedule* below**). Email subject should read Last Name ECON 411 / 611 HW. Graduate students enrolled in ECON 611 must complete additional exercises from identified in the homework. These are listed in the schedule at the end of the syllabus.

**Participation:**

Every student is expected to participate in class by working on exercises presented in class, asking questions, using online resources (i.e., Google, Stack Oveflow, official Python documentation) to find solutions to problems, and participating in discussion.

**Attendance:**

Students are expected to attend class. To receive credit for participation for a missed class with an excused absence, students may complete a make-up assignment based on the material covered during the class period that was missed.

Excused absences are specified in NDSU Policy 333 and include: participation in university sanctioned events, absences due to pregnancy or related conditions, religious observance, legally mandated absence, absence due to military service, personal illness, death of an immediate family member. Students who anticipate excusable absences shall notify the instructor as soon as possible, preferably by the third week of class. In the case of unanticipated excusable events, the student needs to contact the instructor as soon as possible. Students have the responsibility to visit with the instructor if exams or assignments are scheduled during times where absences are required.

**Project:**

Undergraduate students are required to build a computational model that processes or generates data and complete an article (At least 7 pages of text, Times New Roman 11, one-inch margins) that describes the model, its results, and their significance. The paper should cite at least 5 articles from relevant scholarly literature.

*Graduate students* are required to build a computational model that processes or generates data and complete an article (At least 12 pages of text, Times New Roman 11, one-inch margins) that describes the model, its results, and their significance. The paper should cite at least 10 articles from relevant scholarly literature.

Attendance of all presentations is required.

**Communication**

Whenever necessary, I will email the class with announcements via blackboard. This requires that each student regularly check his or her @NDSU.edu email account. It is the student’s responsibility to activate the NDSU.edu email account and employ it in communicating with their department and university administration whenever necessary.

When you send an email to me please put ECON 611 in the title line of the email.

**Honor Code:**

Students are expected to understand and comply with North Dakota State University’s Honor Code. Students may neither give nor receive help from other students or from sources not specifically condoned by the instructor during the exam. Students are obligated to report any violations observed.

***Academic Honesty:*** *All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System (*[*http://www.ag.ndsu.edu/academics/honor-system-1*](http://www.ag.ndsu.edu/academics/honor-system-1)*). The Honor System is a system that is governed by the students and operates on the premise that most students are honest and work best when their honesty, and the honesty of others, is not in question. It functions to prevent cheating as well as penalize those who are dishonest. It is the responsibility of the students to report any violations of the honor pledge to the instructor, honor commission or the Dean of the College of Agriculture, Food Systems, and Natural Resources.*

*The academic community is operated on the basis of honesty, integrity, and fair play.* [*NDSU Policy 335: Code of Academic Responsibility and Conduct*](http://www.ndsu.edu/fileadmin/policy/335.pdf) *applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the* [*Office of Registration and Records*](http://www.ndsu.edu/registrar/)*. Informational resources about academic honesty for students and instructional staff members can be found at* [*www.ndsu.edu/academichonesty*](http://www.ndsu.edu/academichonesty)*.*

***Students with special requirements:*** *Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in the Lower Level of the NDSU Library (231-8463).* [*http://www.ndsu.edu/disabilityservices/*](http://www.ndsu.edu/disabilityservices/)*.*

***Veterans and military personnel****: Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible.*

***Important Dates***

*September 2 Labor Day holiday (no classes/offices closed)*

*September 4 Last day to add classes via Campus Connection*

*September 4 Last day for no-record drop of classes @ 100% refund*

*September 4 Last day to withdraw to 0 credits @ 100% refund*

*September 10 Financial Aid applied to Student Accounts*

*September 16 Last day to submit request to audit, pass/fail*

*September 20 Undergraduate fall graduation application due*

*September 20 Graduate student fall Graduate Degree applications due*

*October 18 Grades of Incomplete convert to F*

*November 4 Spring registration begins*

*November 11 Veteran’s Day (no classes/offices closed)*

*November 15 Last day to withdraw to 0 credits*

*November 15 Last day to drop classes with record (W)*

*November 27-29 Thanksgiving (offices open on Friday)*

*December 2 Fall commencement participation deadline*

*December 9-13 Dead Week*

*December 16-20 Final Examinations*

*December 20 Commencement*

**Homework Schedule:**

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| --- | --- | --- | --- | --- |
| **Dates** | **Section** | **Reading** | **Content** | **Due:** |
| **Week 1**: *8/26-8/30* | Hello World! | Chapter 1: The Essentials | printing; object types; arithmetic; string functions; type errors | Homework 1 |
| **Weeks 2-3:** 9/2-9/13 | Lists and Dictionaries | Chapter 2: Working with Lists | Defining lists vs. arrays; creating, appending/inserting, concatenating, sorting, deleting objects from, slicing, and copying lists; list functions; list length; if statements; for loops | Homework 2 |
| **Weeks 4-5:** 9/16-9/27 | Functions | Chapter 3: Making Lists Useful: Statistical Functions | Functions; statistics | Homework 3 |
| **Week 6-7:** 9/30-10/11 | Classes and Methods | Chapter 4: Classes, Instances, and Methods | Classes; instances; methods; object-oriented programming | Homework 4 |
| **Weeks 8-9:** 10/14-10/25 | Working with Data | Chapter 5: An Introduction to *numpy* and *pandas;* Chapter 6: Importing and Analyzing Datasets with Statistical Functions | Data structures and libraries; manage and clean data; import and write csvs; encoding; data visualization; summary statistics; correlation / covariance matrix; data visualization | Homework 5;  Submit early draft (3 to 4 pages) and data set for project |
| **Weeks 10-12:** 11/4-11/22 | Ordinary Least Squares | Chapter 7: Building an OLS Regression | Ordinary least squares; linear algebra; statistics; data management | Homework 6 |
| **Weeks 13-14:** 11/25-12/6 | Advanced Data Analysis | Chapter 8: Advanced Data Analysis | Double index; *statsmodels*; panel regression | Homework 7;  Project |
| **Week 15:** 12/8-12/13, 12/16 1PM | Presentations | NA |  | Present Project; Attend Presentations\* |

\***Students are required to be present for all presentations during Week 15 and on Dec 16 at 1 PM**