ST 114 Course Syllabus

ST 114 – Statistical Programming

Section 001
FALL 2016
3 Credit Hours

Course Description

This is an introductory course to computer programming for statisticians using python. Emphasis is on designing algorithms, problem solving, and forming good coding practices: methodical development of programs from specifications; documentation and style; appropriate use of control structures such as loops, of data types such as arrays; and of modular program organization; version control. Students will become acquainted with core statistical computational problems through examples and coding assignments, including computation of histograms, boxplots, quantiles, and least squares regression.

Learning Outcomes

Students will:
• apply classic problem-solving techniques to create simple computational programs, namely breaking large problems into smaller ones and reasoning through alternative cases.
• evaluate arithmetic expressions using order operations, promotion from integer to floating-point types, and integer division; demonstrate effective strategies for working with finite precision arithmetic.
• write code containing effective flow control—selecting one course of action among several alternatives based on more than one predicate.
• correct syntax errors, and distinguish runtime errors from errors in logic.
• find and correct logical programming errors via debugging printout and systematic searching.
• implement an object-oriented design.
• demonstrate the use of basic recursion.
• implement the basic elements of version control.
• write effective program documentation.

Course Structure

The course will have two lectures and one lab. Lectures will consist of didactic teaching but will strive to incorporate group activities to help students better master fundamental concepts in computer science. The course will have a weekly lab session devoted to helping students apply what is learned in lecture.

Instructors

Eric Chi (ecchi) – Assistant Professor
Email: eric_chi@ncsu.edu
Web Page: http://www.ericchi.com
Phone: 919-515-1949
Office Location: SAS Hall 5228
Office Hours: MW 3:00-4:00

Lin Dong (ldong7) – Teaching Assistant
Email: ldong7@ncsu.edu
Office Location: SAS Hall 1101
Office Hours: Thu 10:00-11:30 & 2:00-3:30

Course Meetings

This course will have two 75-minute lectures and a 50-minute lab where students, all in the regular classroom. We will use a virtual computer lab during all meetings.

Course Materials

Textbooks

Practical Programming: An Introduction to Computer Science Using Python 3 - Paul Gries, Jennifer Campbell, and Jason Montojo
Edition: 2
ISBN: 978-1-93778-545-1
Cost: 38.00
This textbook is required.

Expenses

None.

Materials

We will use a virtual computing lab. Please bring your laptop if you have it. If you do not have your own laptop, please let the instructor know and the Department of Statistics will provide one for use during the class meetings (you will not be able to take the laptop out of the classroom).

Requisites and Restrictions

Prerequisites

None.

Co-requisites

None.

Restrictions

ST majors only.

General Education Program (GEP) Information

GEP Category

This course does not fulfill a General Education Program category.

GEP Co-requisites

This course does not fulfill a General Education Program co-requisite.

Transportation

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions
Grading

Grade Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Description</th>
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<tbody>
<tr>
<td>Homework assignments</td>
<td>55%</td>
<td>Collections of short weekly programming assignments and related problems. A total of 11~12 assignments</td>
</tr>
<tr>
<td>Midterm</td>
<td>30%</td>
<td>Midterm is closed book. Students may use one 8.5-by-11 inch page of notes (front and back). Basic calculators (such as TI-83) may be used on all exams. Cell phones, tablets, or other electronic devices may not be used as calculators or time keeping devices.</td>
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<tr>
<td>Programming Project</td>
<td>15%</td>
<td>A major programming assignment that will synthesize multiple programming elements from class.</td>
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Details of the projects, along with target dates for programming milestones, will be given in class.

Letter Grades

This Course uses Standard NCSU Letter Grading:

- 97 ≤ A+ ≤ 100
- 93 ≤ A < 97
- 90 ≤ A- < 93
- 87 ≤ B+ < 90
- 83 ≤ B < 87
- 80 ≤ B- < 83
- 77 ≤ C+ < 80
- 73 ≤ C < 77
- 70 ≤ C- < 73
- 67 ≤ D+ < 70
- 63 ≤ D < 67
- 60 ≤ D- < 63
- 0 ≤ F < 60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to [http://policies.ncsu.edu/regulation/reg-02-20-15](http://policies.ncsu.edu/regulation/reg-02-20-15).

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at [http://policies.ncsu.edu/regulation/reg-02-20-04](http://policies.ncsu.edu/regulation/reg-02-20-04).

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular
semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://policies.ncsu.edu/regulation/reg-02-50-3.

### Late Assignments

Students get a total of 7 late (calendar) days to use for homeworks. Once these late days are exhausted, any assignments turned in late will be penalized 25% per late day. However, no assignment will be accepted more than two days after its due date.

### Attendance Policy

For complete attendance and excused absence policies, please see http://policies.ncsu.edu/regulation/reg-02-20-03

**Attendance Policy**

Attendance is required and will be recorded.

**Absences Policy**

Students may miss up to three classes for any reason without providing documentation of their absence. If you are absent for more than three class periods for university-approved reasons suitable documentation of the absence will be required. Starting with the fourth unexcused absence, 1 point will be removed from the final course grade.

### Makeup Work Policy

See “Late Assignments” policy above.

### Additional Excuses Policy

None.

### Academic Integrity

**Academic Integrity**

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01

**Academic Honesty**

See http://policies.ncsu.edu/policy/pol-11-35-01 for a detailed explanation of academic honesty.

**Honor Pledge**

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

### Electronically-Hosted Course Components

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

### Accommodations for Disabilities
Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (http://www.ncsu.edu/dso), 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://policies.ncsu.edu/regulation/reg-02-20-01.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://policies.ncsu.edu/policy/pol-04-25-05 or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course Schedule

NOTE: The course schedule is subject to change.

Week 1 — 08/14/2016 - 08/20/2016
Lecture 1: What is programming?

Week 2 — 08/21/2016 - 08/27/2016
Lecture 2: Hello, Python
Lecture 3: Designing and Using Functions

Week 3 — 08/28/2016 - 09/03/2016
Lecture 4: Designing and Using Functions
Lecture 5: Working with Text

Week 4 — 09/04/2016 - 09/10/2016
Lecture 6: Making Choices

Week 5 — 09/11/2016 - 09/17/2016
Lecture 7: A Modular Approach to Program Organization
Lecture 8: Using Methods

Week 6 — 09/18/2016 - 09/24/2016
Lecture 9: Storing Collections of Data Using Lists
Lecture 10: Repeating Code Using Loops (dot products, matrix-vector products)

Week 7 — 09/25/2016 - 10/01/2016
Lecture 11: Reading and Writing Files
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<thead>
<tr>
<th>Lecture 12: Storing Data Using Other Collection Types</th>
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<tr>
<td><strong>Week 8 — 10/02/2016 - 10/08/2016</strong></td>
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<tr>
<td>Lecture 13: Designing Algorithms</td>
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<td><strong>Midterm</strong> — In class (75 minutes), October 5, 2016</td>
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<td><strong>Week 9 — 10/09/2016 - 10/15/2016</strong></td>
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<td>Lecture 14: Designing Algorithms (Implement Simple Linear Regression, calculate residuals)</td>
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<td>Lecture 15: Searching and Sorting</td>
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<td><strong>Week 10 — 10/16/2016 - 10/22/2016</strong></td>
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<tr>
<td>Lecture 16: Searching and Sorting (Quantile calculations, Median Filtering, Boxplots)</td>
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<td>Lecture 17: Testing and Debugging</td>
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<tr>
<td><strong>Week 11 — 10/23/2016 - 10/29/2016</strong></td>
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<tr>
<td>Lecture 18: Testing and Debugging</td>
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<td>Lecture 19: Object Oriented Programming</td>
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<tr>
<td><strong>Week 12 — 10/30/2016 - 11/05/2016</strong></td>
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<tr>
<td>Lecture 20: Object Oriented Programming</td>
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<tr>
<td>Lecture 21: Object Oriented Programming</td>
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<tr>
<td><strong>Week 13 — 11/06/2016 - 11/12/2016</strong></td>
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<tr>
<td>Lecture 22: Object Oriented Programming</td>
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<td>Lecture 23: Programming with Matrices</td>
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<td><strong>Week 14 — 11/13/2016 - 11/19/2016</strong></td>
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<tr>
<td>Lecture 24: Programming with Matrices</td>
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<td>Lecture 25: Programming with Matrices</td>
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<td><strong>Week 15 — 11/20/2016 - 11/26/2016</strong></td>
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<tr>
<td>Lecture 26: Programming with Matrices</td>
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<td><strong>Week 16 — 11/27/2016 - 11/30/2016</strong></td>
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<tr>
<td>Lecture 27: Programming with Matrices</td>
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<td>Lecture 28: Databases</td>
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