CS 5045: Computation for the Life Sciences I
Syllabus
Fall, 2016

1 General Course Information

CRN	82493
Meeting Time	9:30 PM–10:45 PM; Tuesday/Thursday
Classroom	Pamplin 3004
Midterm Exam	In class, October 13, 2016
Final Exam	10:05 AM–12:05 PM, December 15, 2016

Instructor: Lenwood S. Heath

- **Office:** 2160J Torgersen Hall
- **Office Hours:** 8:00AM–9:15AM Tuesday/Thursday
- **Email:** `heath@vt.edu`

Web Site: `http://courses.cs.vt.edu/~cs5045/fall2016/index.php`

Piazza Signup: `http://piazza.com/vt/fall2016/cs5045`

Canvas: `https://canvas.vt.edu/`

Prerequisite: Graduate standing

Required Textbooks:

- Python Algorithms. Magnus Lie Hetland. Apress, 2014. ISBN: 978-1-4842-0056-8.
- Programming in Python 3 (Second Edition). Mark Summerfield. Addison-Wesley, 2010. ISBN: 978-0-321-68056-3.

Optional Textbooks:

- Introduction to Programming in Python. Robert Sedgewick, Kevin Wayne, and Robert Dondero. Addison-Wesley, 2015. ISBN: 978-0-13-407643-0.
- Introduction to Programming Using Python. Y. Daniel Liang. Pearson Education, 2013. ISBN: 978-0-13-274718-9.

Books On Reserve: For current list, see class Web site.

2 Course Description

This course emphasizes *fundamentals of computer science,* including proficiency in a specific programming language (Python 3); program design, implementation, and testing; programming language syntax and semantics; abstraction and object-oriented programming; data structures; algorithms and algorithm analysis; and databases.

3 Grading Policy

Grading for the course is on a 1000-point scale, with the points distributed as follows:

Homework assignments: 10 at 60 points each	600
Midterm exam: October 13, 2016	150
Final exam: December 15, 2016	250

A typical homework assignment consists of one, two, or three problems, posted on the course Web site approximately one week before the due date. These problems may involve practice with programming in Python 3, running a particular algorithm, or designing and analyzing an algorithm.

All non-programming homework assignments must be prepared with LaTeX[1] or other word processing system and submitted as a single file to Canvas by 4:00 EST on the due date[2]. Use of LaTeX is **strongly** recommended for non-programming assignments, though not absolutely required. **No late homework will be accepted.**

4 Grading Scale

Grade	Points
A	930–1000
A-	900–929
B+	870–899
B	830–869
B-	800–829
C+	770–799
C	730–769
C-	700–729
D+	670–699
D	630–669
D-	600–629
F	0–599

[1] See LaTeX resources on the course Web site.

[2] See due dates on the Calendar on the course Web site.

5 Readings

For most classes, there is a reading assignment (see Section 8) to be completed by class time. Each assignment consists of chapters in the required textbooks.

6 Ethics

The Honor Code applies. All work submitted must be the student's own work. A student may solicit help with homework assignments only from the instructor. A student must complete the midterm and final exams without any outside help of any kind.

7 Announcement

If any student needs special accommodations because of a disability, please contact the instructor during the first week of classes.

8 Course Schedule

Dates	Reading Assignment	Topics
August		
8/22–8/26	Summerfield Chapter 1	Introduction to Python 3
8/29–9/2	Summerfield Chapter 2	Simple data types in Python 3
September		
9/5–9/9	Summerfield Chapter 3	Collection data types in Python 3
9/12–9/16	Summerfield Chapter 4	Control structures and functions in Python 3
9/19–9/23	Summerfield Chapters 5 and 6	Modules and object-oriented programming in Python 3
9/26–9/30	Summerfield Chapters 7 and 8	File handling in Python 3
October		
10/3–10/7	Hetland Chapters 1 and 2	Introduction to algorithms and asymptotic notation; data structures for graphs
10/10-10/14	Hetland Chapters 3, 4, and 6	Divide and conquer, recursion, and recurrences; Mergesort; Quicksort
10/13	**Midterm**	**In class:** Topics through 10/7
10/17–10/21	Hetland Chapter 7	Greedy algorithms; minimum spanning trees
10/24–10/28	Hetland Chapter 8	Dynamic programming; sequence alignment
November		
10/31–11/4	Hetland Chapter 5	Graph algorithms: breadth-first search, depth-first search, and topological sort
11/7–11/11	Hetland Chapter 9	Graph algorithms: shortest path problems
11/14–11/18	Hetland Chapter 11	Complexity classes P and NP; NP-completeness
11/21–11/25	Thanksgiving Break	
11/28–12/2	Summerfield Chapter 12	Databases and SQL
December		
12/6	**Last Day of Class**	Review for final
12/13	**Final**	**10:05 AM–12:05 PM:** Comprehensive exam

End of Syllabus