# CM 151 - Introduction to Computational Science - Fall 2016

Instructor: Eric S. Ho (hoe@lafayette.edu)

Office: Kunkel 13

Office hours: TTh 2-4 pm (or by appointment)

Lecture: MWF 9:00-9:50 am, Venue: Kirby 106 No lab this semester. It will resume in Fall 17.

#### **Course Description:**

The goal of this course is to instill computational thinking in students whose majors are outside computer science. Students will learn techniques to formulate programming codes to solve problems. The general-purpose programming language Python is used as the vehicle to achieve such goal. Python is a simple but elegant programming language, which is widely acclaimed by scientists, engineers, economists, mathematicians, and IT professionals for its simplicity, portability, versatility, and extensibility. This course provides plenty of exercises for students to practice problem solving by applying the concepts they have learned in class.

#### **Learning Outcomes:**

At the completion of this course, students should be able to:

- Think algorithmically
- Master semantics and syntax of Python
- Formulate solutions for simple to intermediate problems in Python codes
- Utilize Python's built-in data structures, such as list, and dictionary
- Read and store information in computer files
- Plot basic graphs using Python's graph library
- Design simulations to study complex problems

#### **Grading Policy:**

- Nine take-home assignments 4% each (total 36%)
- Four one-hour in-class cumulative exams. Each carries 10% (total 40%)
- A four-page essay to summarize your experience in learning computer programming (5%)
- A cumulative final exam (20%)

Practice is extremely important in mastering a programming language. Thus, take-home assignment is designed to help you to learn programming more effectively. You are allowed to discuss the assignments with your classmates. But work must be done individually. You must submit the electronic version of your assignment to Moodle, AND hand in the printed copy to the instructor in order to be graded. Students are highly encouraged to submit their assignment on time. However, if extra time is needed, you must seek prior permission from the instructor. In most cases, requests are granted without penalty.

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Four written exams are scheduled **during regular lecture time.** Check the timetable at the end of the syllabus. Exams are cumulative. All written exams are conducted in closed book format but students are allowed to bring a 2-page hand-written reference note in the exam. Usage of cellphone and computer is prohibited during exam. Test materials are based on lectures and take-home assignments. Past exam questions and extra practice problems are available in Moodle prior to exam.

Final grade is computed based on the sum of weighed points earned in assignments, four inclass written exams, the final essay, and the final exam. Letter grades are assigned according to the following scale:

Α	93-100%	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
В	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	0-59

#### **Required Textbook:**

Python programming in context 2<sup>nd</sup>, Bradley N. Miller, David L. Ranum. Jones & Bartlett Learning.

Students are required to read the assigned readings from the textbook. Exams are based on materials from lectures, assignments AND the textbook.

#### **Attendance Policy:**

Attendance and class participation are critical to learning. Although attendance will not be taken for lectures and labs, statistics tells that attendance highly correlates with the final grade. If there is in-class quiz, absentees will receive a zero for that quiz.

#### **Federal Credit Hour Policy:**

The student work in this course is in full compliance with the federal definition of a four [two or one as appropriate for half and quarter unit courses] credit hour course. Please see the Registrar's Office web site (http://registrar.lafayette.edu/additional-resources/cep-course-proposal/) for the full policy and practice statement.

#### **Academic Honesty:**

You are expected to abide by the college policy on Intellectual Honesty (see student handbook and attached document).

#### **Disability Statement:**

In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students must

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register with the Office of the Dean of the College for disability verification and for determination of reasonable academic accommodations.

### **Privacy Policy:**

Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

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Week		Major Topics	Assigned Reading
1	Aug 29	Introduction and overview of the course	Ch 1
	Aug 31	Python, Annaconda Python, PythonTutor	
	Sep 2	Computing with numbers	
2	Sep 5	Variables	Ch 1
	Sep 7	Turtle graphics	
	Sep 9	Functions & For-loop	
3	Sep 12	Problem solving strategies	Ch 1 + additional
	Sep 14	Code jam	exercises
	Sep 16	Exam I	
4	Sep 19	Archimedes & Function return	Ch 2
	Sep 21	Archimedes & Function return	
	Sep 23	Accumulator Pattern	
5	Sep 26	Leibniz: Accumulator Pattern	
	Sep 28	Monte Carlo: Conditional statements	
	Sep 30	Wallis: Accumulator Pattern	
6	Oct 3	Strings	
	Oct 5	Built-in string functions	Ch 3
	Oct 7	Exam II	
7	Oct 10	Fall break	
	Oct 12	Transposition	_
	Oct 14	Substitution	Ch 3
8	Oct 17	Vignere	
	Oct 19	Lists	Ch 4
	Oct 21	Lists	
9	Oct 24	Lists	_
	Oct 26	Dictionaries	Ch 4
	Oct 28	Dictionaries	
10	Oct 31	Dictionaries	
	Nov 2	File operations	Ch 5
	Nov 4	Exam III	
11	Nov 7	File operations	
	Nov 9	File operations	
	Nov 11	File operations, while-loop	
12	Nov 14	Recursion	Ch 9
	Nov 16	Recursion	
	Nov 18	Recursion	
13	Nov 21	Matplotlib installation	Additional materials
	Nov 23	Thanksgiving	
	Nov 25	Thanksgiving	
14	Nov 28	Pylab graphics	
	Nov 30	Pylab graphics	
	Dec 2	Exam IV	
15	Dec 5	Web scraping	
	Dec 7	Web scraping	Final exam to be scheduled
	Dec 9	Web scraping	rillai exalli to de scrieduled

# CM 151 – Introduction to Computational Science – Fall 2016 Useful Links:

- 1. Python: <a href="http://python.org/">http://python.org/</a>
- 2. Python Tutor: <a href="http://www.pythontutor.com/">http://www.pythontutor.com/</a>
- 3. Stackoverflow: <a href="http://stackoverflow.com/">http://stackoverflow.com/</a>
- 4. pythonanywhere <a href="https://www.pythonanywhere.com/">https://www.pythonanywhere.com/</a>
- 5. <a href="http://www.econpy.org/">http://www.econpy.org/</a> (tailored for economists)
- 6. codeacademy (<a href="https://www.codecademy.com/">https://www.codecademy.com/</a>)