Syllabus
ECE 105: Programming for Engineers 2 -- Spring 2019
Department of Electrical and Computer Engineering
Drexel University

Lecture instructor
Steven Weber
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Teaching assistants
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Contact and office hour guidelines:

- Please try to raise questions or concerns with your laboratory TA during the laboratory
- If not possible, please try to attend an office hour and raise your questions or concerns there
- If not possible, please email your laboratory TA and allow a reasonable time for reply
- If your concern is truly not appropriate for one of the TAs, then please email the instructor
- Office hours will be held in **Bossone 303** – the small conference room on the 3rd floor
- Office hours will be held every week starting in week 2 (Monday April 8th)
- Your TAs and Instructor are here to help you, and we will do what we can to assist you with any problems
- Your TAs will treat each of you with respect, and it is expected you will treat them with that same respect

Credits 3

Course format
There are two hours of lecture and two hours of laboratory each week. Learn will be used for distribution of course material and posting of grades.

- Lectures: Tuesdays 10:00AM – 11:50AM in Disque 103
- Laboratories:

Section	Day	Start Time	End Time	Room	Teaching Assistants
060	Thursdays	10:00AM	11:50AM	Randell Hall 329	Scott Lerner, Chenxi Li
061	Thursdays	12:00PM	1:50PM	Randell Hall 329	Scott Lerner, Chenxi Li
062	Thursdays	2:00PM	3:50PM	Randell Hall 329	Scott Lerner, Chenxi Li
063	Fridays	10:00AM	11:50AM	One Drexel Plaza GL44	Sijie Ran, Zhengqiao Zhao
064	Fridays	12:00PM	1:50PM	One Drexel Plaza GL44	Sijie Ran, Zhengqiao Zhao
065	Fridays	2:00PM	3:50PM	One Drexel Plaza GL44	Sijie Ran, Zhengqiao Zhao

Course prerequisites
- ENGR 131 Introductory Programming for Engineers, OR
- ENGR 132: Programming for Engineers

Catalog course description
This course will cover advanced usage and understanding of programming concepts using Python within the Linux environment. By the end of the course, students will not only possess strong programming capabilities but will also have a firm grasp on scientific computing fundamentals. Students should already have a working knowledge of bash, python, pylint, tmux/GNU screen, X11 tunneling, and at least one terminal based editor (vim, nano, joe, etc) from ENGR 131 or ENGR 132.

Overview
The goal of this course is to expose students to scientific computing concepts in Python, with the concepts illustrated by and motivated by examples drawn from the mathematical, computing, and engineering disciplines.

Required textbook
A Primer on Scientific Programming with Python
by Hans Petter Langtangen
Springer 2012, 3rd Edition
ISBN-13: 978-3-642-30292-3

Recommended but optional textbook
Learning Python, 5th Edition
by Mark Lutz
O'Reilly Media 2013
ISBN-13: 978-1449355739

Required software
Python3.x, with NumPy, and other standard packages for scientific computing. Any Python development environment is fine (e.g., Anaconda, etc.).

Course learning outcomes
At the completion of this course, students will be able to:
- Design code, including modular design, data structures, polymorphism, and object-oriented programming.
- Implement computer programs to solve scientific computing problems pertinent to the field of electrical and computer engineering.
- Design code to perform probabilistic and Monte Carlo simulations.
- Analyze the performance of computer-based simulations.

Based on the above objectives, the curriculum will be enriched by laboratory exercises that tie the skills of programming and algorithmic design directly into relevant scientific computing applications.

Mapping of student learning outcomes

The ABET Student Outcomes are listed below. Outcomes 1, 2, and 3, are intended learning outcomes of this course.

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Grading basis

Final grades for the course will be determined by the total score. The total score has a maximum of 100 points, and is the sum of the score in homework, labs, midterm exam, and final exam.

Assignment	Max Points
Homework	25
Lab attendance	10
Midterm	30
Final	35
Total	100

Final grades for the course will be assigned by the instructor on the basis of a curve of the total scores. While the curve will be computed on the basis of the collection of total scores, the assigned grades are guaranteed to be no lower than the Min Grade column below.

Min	Max	Min Grade
98	100	A+
93	97	A
90	92	A-
87	89	B+
83	86	B
80	82	B-
77	79	C+
73	76	C
70	72	C-
67	69	D+
63	66	D
0	62	F

Course policies

- *Homework:* Collaboration on homework is permitted and encouraged, but each student must turn in her/his own work. Homework is to be submitted online (instructions on submission will be forthcoming separately). No late homework will be accepted. Lowest homework score will be dropped.
- *Laboratories:* In order to receive attendance credit you must be present within five minutes of the start of the laboratory, and be present until either the laboratory session ends, or the TA dismisses you (on account

of having demonstrated to him or her your mastery of the material). Discussion during recitation with fellow students in the lab is encouraged. Use this time to learn together!

Students needing accommodations

Students requesting accommodations due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the ClockWork database before accommodations can be made. These requests are received by Disability Resources (DR), who then issues the AVL to the appropriate contacts. For additional information, visit the DR website, or contact DR for more information by phone at 215.895.1401, or by email at disability@drexel.edu.

Academic policies

- Drexel University Office of the Provost Academic Integrity Policy: http://drexel.edu/provost/policies/academic-integrity/
- Drexel University Office of the Provost Course Add Drop Policy: http://drexel.edu/provost/policies/course-add-drop/
- Drexel University Office of the Provost Course Withdrawal Policy: http://drexel.edu/provost/policies/course-withdrawal/
- Drexel University Office of Equality and Diversity Disability Resources Accommodations Policy: http://drexel.edu/oed/disabilityResources/students/Accommodations/

Course topics

Topics will be likely cover the following list, although exact topic selection may vary at instructor's discretion.

- Arrays: indexing, partitioning, joining, converting, etc.
- Scientific computing: defining and plotting functions, vectorization
- Use of randomness for averaging and integrating (i.e., Monte Carlo)
- Performance analysis: measuring running time as function of input, identifying bottlenecks
- Simulations: cellular automata (e.g., Conway's Game of Life)
- Discrete event simulation (e.g., queues and queueing networks)

Course calendar

Wk	Lecture	Laboratories	Homework due	Deadlines
1	Tue April 2 10:00-11:50am: LECTURE	Thu, Fri April 4-5: LABORATORY	Week 1 HW due on Wed April 10 11:59pm	Sun April 7: **Add/Drop deadline**
2	Tue April 9 10:00-11:50am: LECTURE	Thu, Fri April 11-12: LABORATORY	Week 2 HW due on Wed April 17 11:59pm	
3	Tue April 16 10:00-11:50am: LECTURE	Thu, Fri April 18-19: LABORATORY	Week 3 HW due on Wed April 24 11:59pm	
4	Tue April 23 10:00-11:50am: LECTURE	Thu, Fri April 25-26: LABORATORY	Week 4 HW due on Wed May 1 11:59pm	
5	Tue April 30 10:00-11:50am: LECTURE	Thu, Fri May 2-3: LABORATORY	Week 5 HW due on Wed May 15 11:59pm	
6	Tue May 7 10:00-11:50am: **MIDTERM EXAM**	Thu, Fri May 9-10: **LAB CANCELLED**	**NO HW FOR WEEK 6**	
7	Tue May 14 10:00-11:50am: LECTURE	Thu, Fri May 16-17: LABORATORY	Week 7 HW due on Wed May 22 11:59pm	Fri May 17: **Withdraw deadline**
8	Tue May 21 10:00-11:50am: LECTURE	Thu, Fri May 23-24: LABORATORY	Week 8 HW due on Wed May 29 11:59pm	
9	Tue May 28 10:00-11:50am: LECTURE	Thu, Fri May 30-31: LABORATORY	Week 9 HW due on Wed June 5 11:59pm	
10	Tue June 5 10:00-11:50am: LECTURE	Thu, Fri June 6-7: **LAB CANCELLED**	**NO HW FOR WEEK 10**	
11				**FINAL EXAM DATE TBD**