UNIVERSITY OF CALIFORNIA
UCMERCED

Syllabus for BIOE021-01: Computing for Bioengineers

Fall 2018
Instructor: Arvind Gopinath

Designation:	BIOE-021: Computing for Bioengineers
Catalog Description:	BIOE21 provides an introduction to scientific and engineering computer programming using Python (mostly) and some aspects of MATLAB® with an emphasis in problems and approaches most relevant to bioengineering. Programming fundamentals will be covered using specific scientific/engineering applications involving random number generation, sequences and difference equations, discrete calculus and differential equations. Laboratory included.
Text Books and Other Required Materials:	ISBN: 9783662498866 Edition: 5TH 16 Status: 5TH 16 Title: PRIMER ON SCIENTIFIC PROGRAMMING... Author: LANGTANGEN Publisher: SPRINGER
Course Objectives/ Student Learning Outcomes:	By the end of this course, students will be able to: 1) Apply knowledge of scientific computing and mathematics to programming. 2) Learn the skills, techniques and tools to formulate computing problems in science and engineering in the form of Python and MATLAB® code. 3) Gain an understanding of the importance of computing in modern scientific and engineering practice. 4) Learn the general principles for debugging MATLAB® and Python code. 5) Gain an understanding of how to apply computing methods for the analysis of biological data and the design of bioengineering and biophysics applications. 6) Attain the basic conceptual foundation and training to learn advanced scientific and engineering computing methods.
Program Learning Outcomes:	
Prerequisites by Topic:	None; however, all students are recommended to brush up on college calculus and read as will be indicated in class. Notes will be provided and uploaded if needed.
Course Policies:	It is not necessary for you to have your own computer for this course, as all computing resources necessary will be provided in the lab. Lab assignments are designed to be completed within the designated weekly lab sessions. However, if you do not complete a particular assignment during normal lab hours, you may use any Open Access lab to complete your work. Our labs will use the windows operating system - however instruction will be provided if necessary using Linux or Osx. Suitable programming environments will be used as required. For Lab assignments, you may work together with other students if you wish or when assignment asks for explicit collaboration. Giving each other help in finding bugs and in understanding the assignment is encouraged. It is permissible to allow other students to see small portions of your code on-screen during lab, but you may not allow them to copy directly. You may, of course, seek assistance from the course Teaching Assistants and the course Instructor for all the assignments. Lab sections are where you will get most of the information and learn so it is important to be

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Academic Dishonesty Statement:	a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work. b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action. c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.
Disability Statement:	Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.
Topics:	The course will focus on Python as an optimum compromise between fast learning curve, flexibility, potential for mathematical and engineering computing, portability and integration, and/or computing environments and availability of existing code specialized for bioengineering applications. Topics will include fundamentals of computer programming including loops and lists, functions and branching, input data and error handling, array and matrix computing, data plotting, files and strings, classes, object oriented programming, debugging and migration will be covered in conjunction with general scientific and engineering applications including random number generation, sequences and difference equations, discrete calculus and differential equations and image analysis, tailored to specific problems in bioengineering.
Class/laboratory Schedule:	
Midterm/Final Exam Schedule:	Final term project will be due the date of the final exam. No mid-term exams.
Course Calendar:	
Professional Component:	Relation to the following ABET Problem Learning Outcomes (PLOs): (a) an ability to apply knowledge of mathematics, science, and engineering (b) an ability to design and conduct experiments, as well as to analyze and interpret data (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political,

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Assessment/Grading Policy:	Letter grade only Grading will be based on weekly computer-based lab assignments and a practical final exam that will be open-book and open-notes. Final grade will be calculated based on the following: Assignments/Lab (60%) In Class - Quizzes (20%) Final project (20%)
Coordinator:	
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Office Hours:	TBA