THE UNIVERSITY OF TEXAS AT AUSTIN
Department of Aerospace Engineering and Engineering Mechanics
Texas Advanced Computing Center (TACC)

Scientific Computation, COE 332
Fall 2019

SYLLABUS

Unique Number: 13530

Instructor: Je'aime Powell, jpowell@tacc.utexas.edu
Charlie Dey, charlie@tacc.utexas.edu

Time: 3:30p - 5:00p

Location: ASE 1.112A

Teaching Assistant.: TA Name (with location and office hours) or None

Web Page: Web address for the course if one exists.

Catalog Description:
List current semester catalog description.
(http://registrar.utexas.edu/catalogs/ug08-10/ch07/ug08.cr07a.ge-bme.html)

Course Objectives: Describe course objectives.

Prerequisites: List any prerequisites.

Knowledge, Skills, and Abilities Students Should Have Before Entering This Course:
List of the knowledge, abilities, and skills (e.g., calculate mass balances, calculate Reynolds number, communicate via technical writing, use spreadsheets, word processors, and statistical analysis software) students should have before entering the course.

Knowledge, Skills, and Abilities Students Gain from this Course (Learning Outcomes):
List of the knowledge, abilities, and skills students should gain from the course.

Impact On Subsequent Courses In Curriculum:
Impact of the course on subsequent ones (i.e., how material learned in the course is used in or is prerequisite to later courses).

Relationship of Course to Program Outcomes:
This course contributes to the ABET Criterion 3 student outcomes that took effect with the Fall 2019 semester. For more information, see *Criteria for Accrediting Engineering Programs, 2019 – 2020* at https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2019-2020/

STUDENT OUTCOME	
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	√
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	√
3. an ability to communicate effectively with a range of audiences	
4. 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	
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	√
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	√
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	√

ABET Program Criteria Achieved:
Program criteria are unique to each degree program and are to be compiled from the program criteria given for each degree program and listed in table format below. The faculty should check which of the program criteria are achieved in the course.

Criterion	√	Criterion	√	Criterion	√
A. Aerodynamics		G. Orbital Mechanics		M. Preliminary/Conceptual Design	
B. Aerospace Materials		H. Space Environment		N. Other Design Content	
C. Structures		I. Attitude Determination and Control		O. Professionalism	
D. Propulsion		J. Telecommunications		P. Computer Usage	√
E. Flight Mechanics		K. Space Structures			
F. Stability and Control		L. Rocket Propulsion			

Topics:
Computational Thinking(2)
Linux (2)
C++ (16)
Data Structures (2)
Object Oriented Programing and Design (4)
Fortran (10)

Python/R (2)

Professionalism Topics:
Learn to effectively go from conceptualizing a program, designing program, to coding a program
Learn to work and manage a group project, breaking the project into parts, assigning parts to team members, and working together to complete the project
Write a professional level research paper

Design Assignments:
Describe clearly any design assignments.

Computer:
A computer capable of running SSH and a terminal application is required.

Text:
https://bitbucket.org/VictorEijkhout/textbook-introduction-to-scientific-programming/src/default/

Class Format:
This class is 40% lecture and 60% hands-on-labs
Each lecture will include atleast 2 hands on, ungraded labs
There will be approximately 6 homework assignments
There will be 2 exams (C++, Fortran)
There will be 2 projects (C++, Fortran)

There is a Piazza online course available. All lecture slides will be posted there. Piazza also has

Class Schedule:
C++ Exam: October 31st, 2019 (Tentative)
Fortran Exam: December 5th, 2019 (Tentative)
All Projects Due: Decemeber 6th, 2019

Class Outline:
Welcome
Intro to Linux
Computational Thinking
C++
- Hello World
- Variables
- Conditionals
- Loops
- Functions
- Vectors
- Data Structures
- Dynamic Memory
- Objects

Special Topic
Fortran
- Hello World
- Variables
- Conditionals

Loops
Subprograms
Functions
Vectors/Matrices
Advanced Fortran
Python
R

Grading:
Homework: 30%
Projects: 30%
Exams: 40%
Participation: up to 5% extra credit

Homework Policy:
Labs are not graded, however the homework assignments - which are graded - are built from the labs, and the base concepts required for projects are built from the homework. It is *highly* recommended you follow along with the instructors during labs.

The projects will require some independent research to compelete

Examinations:
There will be 2 exams, one covering your knowledge on C++ concepts and reading code, the other will be covering your knowledge on Fortran concepts and reading code

Attendance:
Attendance is not required, however homework assignments are built from the hands on labs, missing the labs will make completing the homework that much more difficult. If you are going to miss class due to an academic event (conference, job fair) please give the instructors 2 weeks notice, so they can better prepare for classes.

Office Hours:
Office hours are immediately before and after class. Location to be determined. Office hours are available by request at TACC

Important Dates:
September 3, Tuesday Fourth class day; Last day of the official add/drop period; after this date, changes in registration may require the approval of the department chair and usually the student's dean.

Special Notes:
The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD or the Cockrell School of Engineering Director of Students with Disabilities at 471-4321.

Evaluation:
Note that the Measurement and Evaluation Center forms for the Cockrell School of Engineering will be used during the last week of class to evaluate the course and the instructor. You may also want to note any other methods of evaluation you plan to employ.

Prepared by: Jeaime Powell and Charlie Dey Date: 08/20/2019