PHYS 319 – Computational Physics with Python

COURSE SYLLABUS: Spring 2019

INSTRUCTOR INFORMATION

Instructor: Dr. Heungman Park
Office Location: Science Building room 240
Office Hours: [Mon, Wed: 1:30 PM - 2:30 PM], [Tue, Thur: 10:00 AM - 11:00 AM] or by appointment
Office Phone: 903-886-8654
Office Fax: 903-886-5480 (Department of Physics and Astronomy)
University Email Address: heungman.park@tamuc.edu
Preferred Form of Communication**:** email
Communication Response Time: within 24 hours

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Textbook(s) Required:

Computational Physics with Python, by Mark Newman,
ISBN-10: 1480145513
ISBN-13: 978-1480145511

Software Required:

Anaconda Python 3.x package. Anaconda3-5.1.0 version is recommended.

Optional Texts and/or Materials: none

The *syllabus/schedule are subject to change.*

Course Description

This self-contained course introduces the student to the Python programming language before exploring applications including finite difference methods, solving linear and non-linear equations, Fourier transforms, simulating physical systems governed by ordinary and partial differential equations, random processes and the Monte Carlo method. Prerequisites: PHYS 2425 or PHYS 211 (programming experience will be helpful, but is not required).

Student Learning Outcomes

1. To understand the basics of scientific, numerical simulation and modeling
2. To learn to use the graphical capabilities of Matplotlib to visualize numerical solutions into highly interpretable forms
3. To gain intuition for the quality of simulations results (just because a program runs without error does not guarantee the results are correct)

COURSE REQUIREMENTS

Minimal Technical Skills Needed

Basics computer skills such as internet surfing, installing programs. Programming experience will be helpful, but is not required.

Instructional Methods

Today computational physics is a powerful approach to probing natural phenomena. In this course, students will learn first how to program in Python programming language and to make plots with Matplotlib. The remainder of the course will introduce students to several of the main computational tools, techniques, and methods of computational physics. This is a practical course, meaning students will be learning mostly by doing: writing programs, running them, debugging, etc., until they get answers that are physical and plausible. The knowledge of how to implement numerical solutions to problems, and the limits of these simulations, should be useful for the future study of students.

Student Responsibilities or Tips for Success in the Course

Students must check a course website. All assignments are posted in the course website.

GRADING

Final grades in this course will be based on the following scale:

A = 90%-100%

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B = 80%-89%

C = 70%-79%

D = 60%-69%

F = 59% or Below

Grading Procedure

- Homework: 30-40 %, Attendance: 5-10 %, Quiz: 5-10 %
- Exam 1: 5-15 %, Exam 2: 10-20%, Exam 3: 10-20%, Comprehensive final exam: 30-40 %

* The scales can be adjusted by the instructor. The final grading policy will be announced before the final exam.

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu**.**

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

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COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor Statement

The instruction will respond within 24 hours by email. Each graded assignment and test will be returned within a week.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

General Classroom
No food is allowed during the class except for beverages with lids.
Students are expected to be on time and present for all class meetings. If an emergency results in an absence, the student should contact the instructor as soon as possible informing the instructor of the emergency and inquiring about ways to make up the missed class. The instructor will make judgment on how to handle the situation. Possible reasons for excused absence are listed in the "Student's Guidebook" under class attendance policy. Attendance and tardy records will be maintained and both may result in deductions from your overall grade. Five unexcused absences will automatically result in a failing grade.

Homework: Each student must work on the assigned homework problems on his/her own time. Collaboration is encouraged, but students must understand what they did on the work and be able to explain it to the instructor. If only answers are shown, no credits may be given.

Penalties of Late Work: 20 % deduction within 48 hours, 30% deduction within 96 hours, and no credits after then.

Exams: There will be three midterm exams and a comprehensive final exam. Make-up exams will only be allowed for excused absences such as sickness with a doctor's note and jury duty. Only one make-up exam is allowed. The final exam must be taken.
In-class Quiz: A quiz will be given once or twice a week. Quiz contents will be announced during lecture.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:
https://www.britannica.com/topic/netiquette

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

Undergraduate Academic Dishonesty 13.99.99.R0.03

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

Graduate Student Academic Dishonesty 13.99.99.R0.10

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

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COURSE OUTLINE / CALENDAR

Week 1	1/14/2019	-	1/18/2019	Introduction to Python Programing 1
Week 2	1/21/2019	-	1/25/2019	Introduction to Python Programing 2
Week 3	1/28/2019	-	2/1/2019	Introduction to Python Programing 3
Week 4	2/4/2019	-	2/8/2019	Introduction to Python Programing 4
Week 5	2/11/2019	-	2/15/2019	Making plots with Matpotlib
Week 6	2/18/2019	-	2/22/2019	3D vector plots with VPython
Week 7	2/25/2019	-	3/1/2019	Accuracy and speed
Week 8	3/4/2019	-	3/8/2019	Integrals and derivatives 1
Week 9	3/11/2019	-	3/15/2019	Integrals and derivatives 2
Week 10	3/18/2019	-	3/22/2019	**Spring Break**
Week 11	3/25/2019	-	3/29/2019	Solution of linear and nonlinear equations 1
Week 12	4/1/2019	-	4/5/2019	Solution of linear and nonlinear equations 2
Week 13	4/8/2019	-	4/12/2019	Fourier transforms
Week 14	4/15/2019	-	4/19/2019	Random processes and Monte Carlo Methods
Week 15	4/22/2019	-	4/26/2019	Selected topics
Week 16	4/29/2019	-	5/3/2019	Selected topics
Week 17	5/6/2019		5/10/2019	**Final exam**

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