Syllabus: Introduction to Scientific Computing  
PHYS 105A Sections 1 & 2 Fall 2019

Instructor: Prof. Elisabeth Krause  
Email: krausee@email.arizona.edu  
Office: Steward Observatory 322  
Office Hours: Wednesday 11-noon, or by appointment.

TA (both sections): Tiankui Zhang  
Email: tiankuizhang@email.arizona.edu  
Office Hours: Wednesday 10 am, PAS Room 555, or by appointment.

Include PHYS 105A in the subject line of all emails

Class:  
Section 1 Wednesday 2:00-3:50 PM  
PAS Room 272 Computer Lab  
Section 2 Wednesday 4:00-5:50 PM  
PAS Room 272 Computer Lab

Prerequisite: Calculus I - Math 122B or Math 125 or equivalent  
Co-requisites: Mechanics - PHYS141 or PHYS161H

Textbook:  
A Student’s Guide to PYTHON For Physical Modeling. (Updated Edition)  
Jesse M Kinder, Philip Nelson  
ISBN 978-0-691-18057-1

Course Goals:
1) Learn the Python programming language  
2) Learn to use Jupyter Notebooks  
3) Learn basic graphical techniques  
4) Apply programming to physics problems  
5) Walk away feeling confident in your abilities to code.

Evaluation:  
(Almost) Weekly Problem Sets. 90%  
In Class Participation 10%

You will be required to submit assignments through D2L.  
No extensions, however your final grade will computed excluding the two lowest score problem sets.

“Participation” includes attending class regularly, completing in-class assignments, asking relevant questions during class, seeking help during study sessions and office hours, etc.  
Final course grades will be assigned as follows: A (90-100%); B (80-89%); C (70-79%); D (60-69%); E (<60%).
Incomplete (I) or withdrawal (W) Grades: Requests must be made in accordance with University policies, which are available at:

http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete

http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal

Tentative class schedule (subject to change, depending on our in-class progress)
Week 1 (8/28): Unix commands, what’s a computer program
Week 2 (9/4): Jupyter and Python Syntax, Variables and Operators
Week 3 (9/11): Conditional Statements and Loops
Week 4 (9/18): Functions
Week 5 (9/25): Strings and Lists
Week 6 (10/2): Arrays
Week 7 (10/9): File I/o and Plotting
Week 8 (10/16): More Plotting: Histograms and Error Bars
Week 9 (10/23): Statistics with Numpy
Week 10 (10/30): Animation
Week 11 (11/6): Recursion, Sorting
Week 12 (11/13): Fractals
Week 13 (11/20): Linear Algebra with Numpy
Week 14 (12/4): Image data
Week 15 (12/11): Current Research Applications

Absence and Class Participation Policy: Lecture material and in class assignments are essential to this course. Attendance is required. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant third parties. The UA policy concerning Class Attendance, Participation, and Administrative Drops is available at:

http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable:

http://policy.arizona.edu/human-resources/religious-accommodation-policy

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. https://deanofstudents.arizona.edu/absences

Classroom Behavior

- **Academic Integrity**: All students in this course are expected to abide by the University of Arizona’s Code of Academic Integrity
  http://dos.web.arizona.edu/uapolicies/

- **Cheating is not tolerated in any form.** If a student is caught cheating on any assignment or presentation the penalty will be failure in the course. In all cases a
letter will be sent to the Dean of Students describing the incident. If you are aware that someone else is cheating, it is your obligation to inform the instructor.

- We allow, even encourage, collaboration on assignments. However, you must always write the final version of an assignment yourself, and use your own words to describe what you have concluded. In particular, if we receive verbatim code from more than one person we will ask you to explain your answers in your own words.

- Plagiarism is strictly prohibited. If you are uncertain as to what constitutes plagiarism see: http://deanofstudents.arizona.edu/codeofacademicintegrity

- Cell Phones: The use of cell phones is not allowed in the class.

- Attendance is mandatory. In class attendance is required for this course.

Subject to Change Notice

Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor of this course.

ASSISTANCE

We are here to help you, so please take advantage of help sessions. We also want to get to know you, so you are very welcome to stop by to introduce yourself. Please contact us promptly if you have any questions or concerns regarding this class.

If you anticipate barriers related to the format or requirements of this course, please meet with me so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; drc.arizona.edu) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

The University of Arizona provides a wide variety of resources to help you feel more at home in the UA environment. Examples of student resource/cultural centers include:

African-American Student Affairs Center  https://aasa.arizona.edu/
Asian & Pacific American Student Affairs Center  https://apasa.arizona.edu/
Guerrero Student Center https://chsa.arizona.edu/
Immigrant Student Resource Center https://eao.arizona.edu/isrc
LGBTQ+ Student Affairs Center https://lgbtq.arizona.edu/
Native American Student Affairs Center https://nasa.arizona.edu/
Transfer Student Center https://transfer.arizona.edu/
Veterans Education and Transition Services Center https://vets.arizona.edu/
Women & Gender Resource Center https://wrc.arizona.edu/
Where to go, who to call if you're in crisis:

Are you a University of Arizona student? If it is not an emergency and you are a UA student, call or walk-in to Counseling and Psych Services at 520-621-3334 Monday - Friday. Walk-in triage is available between 9 am and 4 pm Monday - Friday.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our Friend 2 Friend website.

Resources for sexual assault, relationship violence, and stalking.

24-Hour Hotlines:

The National Suicide Prevention Lifeline is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing 1-800-273-TALK (8255), the call is routed to the nearest crisis center in our national network of more than 150 crisis centers. The Lifeline’s national network of local crisis centers provides crisis counseling and mental health referrals day and night.

Crisis Text Line: Text HOME to 741741 from anywhere in the United States, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds, all from a secure online platform. Find out more about how it works at crisistextline.org.

Suicide Prevention for LGBTQ Youth through the Trevor Project:

- The Trevor Lifeline is a 24/7 suicide hotline: 866-4-U-TREVOR (1-866-488-7386)
- TrevorChat: Online instant messaging available 7 days a week, 3 pm - 10 pm ET (12 pm -- 7 pm PT)
- TrevorText: Confidential and secure resource that provides live help for LGBTQ youth with a trained specialist, over text messages. Text TREVOR to 1-202-304-1200 (available 7 days a week, 3 pm - 10 pm ET, 12 pm -- 7 pm PT)

Veterans’ Suicide Prevention Lifeline: 1-800-273-TALK (1-800-273-8255)

SAMHSA Treatment Referral Hotline (Substance Abuse): 1-800-662-HELP (1-800-662-4357)

National Sexual Assault Hotline: 1-800-656-HOPE (1-800-656-4673)

Loveisrespect (National Dating Abuse Helpline): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question. Go ahead and text your comment or question and we will reply.