

CSCI250 – Python Computing: Building a Sensor System (Spring 2018)

TR Section A: 12:30-1:45 and Section B: 2:00-3:15 Marquez Hall 026

Course Website: <http://cs.mines.edu/Courses/csci250/>

Course description:

This course will teach students the skills needed for data collection, analysis, and visualization on a small-embedded device (e.g., Raspberry Pi). Students will learn basic Linux, Python, and the programming skills needed to control the hardware and associated sensors. This hands-on course includes a baseline project, four introductory projects (e.g., acoustic, acceleration, magnetic field, optical), and a final Capstone project. The Capstone project will have students create their own application using the techniques learned during the first half of the semester; students will then present their Capstone project through a formal presentation, write-up, and demonstration.

Instructor Information:

Dr. Wendy Fisher, wfisher@mines.edu

<http://inside.mines.edu/~wfisher/>

Office: BB 280D

Office Hours: Wednesday 1-4 (and by appointment - email me to setup :~)

Teaching Assistants

Caleb Jhones, cjhones@mymail.mines.edu

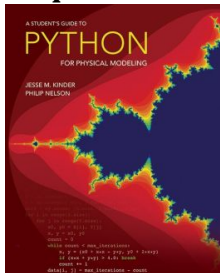
James Kiouis, jkiouis@mymail.mines.edu

Course Learning Outcomes:

By the end of this course, students will be able to:

- Create, navigate, and manage files and directory structures using basic Linux shell commands.
- Describe the functionality and purpose of the individual components of the Raspberry Pi Hardware.
- Install the Raspbian operating system onto the Raspberry Pi Hardware and setup basic configuration parameters.
- Download, install, and develop programs using an Integrated Development Environment (IDE) on the Raspberry Pi Hardware.
- Develop and run basic Python functions and programs in the Linux environment to collect data from sensors using the Raspberry Pi Hardware (e.g., optical, acoustic, acceleration, magnetic).
- Plot and analyze data from the sensor system and compare to mathematical models.

Required Textbook:



A Student's Guide to Python for Physical Modeling, Jesse M. Kinder, Philip Nelson

Equipment:

- CSM Computer Science Kit (KIT-14122) – this will be available after the first day of class (details during our first day), it will be \$135 cash or check and includes all the sensors, equipment needed for your projects, and a raspberry pi that you will keep.
- Any type of USB Keyboard/Mouse (wired, wireless, or combo)

Optional:

- Anti-static wristband (various) – (Amazon: Calunce 2.5M Reusable Anti-Static Wrist Straps equipped with PU Grounding Wire and Alligator Clip)
- Small flathead screwdriver, needle-nose pliers
- Plastic container for carrying equipment around (e.g., 11" x 14" x 3" would fit all of the above except maybe the keyboard)

Expectations

You are expected to attend all classes and come prepared to actively participate in the activity and discussion for the day. To do well in this course, you must keep up with the out of class material and engage in the in class activities. We promise to prepare you and to provide you with the tools needed to succeed.

Student Evaluation

The final course grade will be computed from the following course percentage breakdown:

10% Participation and Attendance	5% Magnetic Field lab and write-up
5% Baseline lab and write-up	15% Quizzes
5% Optical lab and write-up	20% Midterm Exam
5% Acoustic lab and write-up	30% Final Project and Presentation
5% Acceleration lab and write-up	

Final grades will be determined using a straight scale; letter grades will be posted in Canvas:

90-100	A	60-69	D
80-89	B	below 60	F
70-79	C		

You must pass both the final project and the final presentation with at least a 60% grade in order to pass this course.

For a discrepancy in any grade in which you think you deserve more points than you received, you must raise the issue within one week of the day the item was returned. No claims, justifiable or not, will be considered after this deadline.

Grading will be done on an absolute, but adjustable scale. This means that there is no curve. Anyone earning 90% or more of the total number of points available will receive a grade of A; 80% or higher a B, etc. This scale may go down, but it will not go up.

Late policy:

Late work is strongly discouraged. All work will be accepted within 4 working days after the deadline (weekend and holiday days do not count in the 4 days). Students will lose 10 percentage points per day late. After 4 days, the work will not be accepted at all.

Coursework Return Policy:

Homeworks and exams will be graded and returned as quickly as possible, generally within a week.

Academic Integrity: All students are advised to be familiar with university policy on Academic Integrity. In addition, The following Collaboration Policy exists for all CS@Mines courses. This policy is a minimum standard; your instructor may decide to augment this policy.

1. If the project is an individual effort project, you are not allowed to give code you have developed to another student or use code provided by another student. If the project is a group project, you are only allowed to share code with your group members.
2. You are encouraged to discuss homework and final project assignments with other students in the class, as long as the following rules are followed:
 - a. You view another student's code only for the purpose of offering/receiving debugging assistance. Students can only give advice on what problems to look for; they cannot debug your code for you. All changes to your code must be made by you.
 - b. Your discussion is subject to the empty hands policy, which means you leave the discussion without any record [electronic, mechanical or otherwise] of the discussion.
3. Any material from any outside source such as books, projects, and in particular, from the Web, should be properly referenced and should only be used if specifically allowed for the assignment.
4. To prevent unintended sharing, any code stored in a hosted repository (e.g., on github) must be private. For group projects, your team members may, of course, be collaborators.
5. If you are aware of students violating this policy, you are encouraged to inform the professor of the course. Violating this policy will be treated as an academic misconduct for all students involved. See the Student Handbook for details on academic dishonesty.

Violations of this policy result in one of a range of punitive measures, from a zero score for an assignment, up to and including a course letter grade drop for all students involved.

All issues of misconduct are reported to the Dean of Students.

Academic misconduct associated with an exam grade will likely result in course failure.

Student Absences: All students are advised to be familiar with university policy regarding the make-up of work missed due to excused absences. This policy may be found in the Bulletin.

Disabilities Accommodations: The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you are registered with Disability Support Services (DSS) and I have received your letter of accommodations, please contact me at your earliest convenience so we can discuss your needs in this course. For questions or other inquiries regarding disabilities, I encourage you to visit disabilities.mines.edu for more information.

Discrimination & Harassment: This course and all learning opportunities at Mines require a safe environment for everyone to be productive, develop professional practices, and to be able to share

and learn without fear of discrimination or harassment. Discrimination or harassment of any type will not be tolerated. Sometimes harassment is unintentional, but regardless of intent the instructor will address any language or behaviors that might discriminate, stereotype, or promote harassment. If you witness discrimination or harassment of others, please bring it to the attention of Mines faculty so it can be addressed immediately.

Title IX is a federal law that protects individuals from discrimination based on sex and gender in educational programs or activities. Mines takes its Title IX obligations seriously and is committed to providing a campus community free from gender-based discrimination. Gender-based discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited within the Mines campus community. If these issues have impacted you or someone you know, you can appropriate resources here: <http://inside.mines.edu/POGO-Title-IX>. You can also contact the Mines Title IX Coordinator, Karin Ranta-Curran, at 303.384.2558 or krcurran@mines.edu for more information.

Learning Environment: Fundamentally, I expect and require respect in this course for yourself, your classmates, and your instructor and TAs.

- Respect for yourself includes taking care of yourself physically and mentally and advocating for an environment that facilitates learning for you.
- Respect for your classmates includes recognizing and appreciating the diversity of backgrounds and experiences of your classmates and making it your interest to foster a learning environment for everyone; all are welcome.
- Respect for your instructors (as well as your classmates) includes not participating in disruptive or distracting behavior: talking, playing games, or web surfing during lecture, for instance, make it difficult for others to focus on the reason we are all here.
- Respect must be mutual to be effective; we (your instructors) and your TAs will be held to the same standards of respect.

Please let your instructor know if you become aware of an issue with the classroom (or out-of-classroom) environment with regards to these policies.