GIS and DATA 167
Introduction to Python Programming

Professor:
Dr. Joanna Bieri
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Class:
Spring 2025
M,W 6:00-7:20pm + Thursday Lab TBA

Office Hours:
Wednesday 4-5:30pm (Duke 209)
Friday 4-5pm (AHN 217)

Welcome to Python Programming

My goal is to help each and every student learn how to do computer programming in Python and achieve their personal learning goals so that they can use Python in their areas of study. I value a diversity of opinions, learning approaches, cultural backgrounds, abilities, and ideas in my class. Classes, lectures, and group interactions should be a safe learning space where each member of the community feels valued, listened to, and respected. It is the responsibility of each of us to ensure that we are lifting up our peers, breaking free from old biases, reaching across cultural or socioeconomic boundaries, and supporting each other. If at any time in the class you feel that there is something that could be done to improve your learning or your experience please let me know. I am here to lift you up and help you learn!

About This Course

This course is an introduction to structured computer programming in the Python Language. We will learn about computational thinking, algorithmic problem solving and Python programming with a wide range of applications including projects in mathematics, spatial studies, and engineering. The course includes two sessions of class lecture and an optional open programming lab where we will put on music, relax, and help each other write amazing code! Attendance is expected at all class meetings unless you have notified me ahead of time.

Course Learning Objectives

By the end of the semester your work must reflect your ability to

1. Use computers and the python programming language to solve problems in the real world or your area of study.
2. Implement basic concepts from programming: variables, conditional statements, loops, etc.
3. Understand and use different data types: integers, floats, strings, lists, dictionaries, etc
4. Write code that accepts input from users and make your code interactive.
5. Define functions and/or modules that divide your programs into components that can be independently debuged, maintainted, and reused.
6. Write code that handles common errors gracefully and understand how to test your code.
7. Recognize the basics of data abstraction.
8. Import and use important python packages such as numpy for mathematical or statistical calculations, matplotlib for graphical explorations, sympy for symbolic logic, and pandas for data exploration.
9. Use python packages for simple data visualization and analysis.
10. Have some fun telling computers to do the hard work for you!

What are your goals for the class?

Technology

You absolutely need access to a computer that can run Anaconda Python and Jupyter Notebooks/Lab. We will install all the packages you need on the first day of class. We will use Jupyter Notebooks (or Google Colab if this fails) for initial explorations and in class work but your weekly programming assignments will be submitted as .py scripts. I highly suggest the PyCharm IDE for editing your code, but you are welcome to use the IDE of your choice (Sublime and Eclipse +PyDev are really good options). If all of this sounds like a foreign language - have no fear! It will all be explained in class.
Daily practice problems, programming assignments, and lectures will be posted on the class website. Practice problems and programming assignments will be submitted on Canvas.

Required Texts

- Python Crash Course, 3rd Edition: A Hands-On, Project-Based Introduction to Programming, Eric Matthes (978-1718502703) - Cost: $45

- Other texts, labs, and articles made available via our course website and Canvas.

Classwork

My goal in this class is to support your learning experience, but it is your responsibility to be actively engaged in the course to get the most out of the experience. I do expect to see you in class every day with a positive attitude and a willingness to learn.

i. **Class Preparation, Attendance, and Practice Problems**:

Before you arrive to class you are expected to participate in the preparatory materials. Each day content videos will be posted on the class website covering the basic content for the day's class. You should /bf watch the videos and take notes. In addition practice problems will be posted that you can try to test your understanding. You should come to class having tried most of these problems. The practice problems will be in the form of a jupyter notebook, you should come to class with the notebook downloaded and running on your own computer. It should also include your attempts to solve all of the practice problems.

Practice problems are due before each class and solutions will be provided when you submit your work. These are graded as submitted or not submitted and worth one point. It is okay if you got some or all of them wrong or if your code does not work yet. Your goal is to get as far as you can before looking at solutions and coming to class for help. There will be a total of 23 practice problem sets in this class, you must submit 20.

During class we will work in groups with our peers to make sure we understand all the material. Each class you will have a chance to ask lots of questions and get help on the practice problems. Then we will work on in class challenge problems and do live programming experiments. You are expected to attend class and actively participate. Unexcused absences will negatively impact your grade.

ii. **Weekly Programming Assignment**:

Each week on Friday (starting Friday January 17th) you will submit your weekly Programming Assignment (2 points). Programming assignments are assigned during Monday's class and will take the form of a professional specifications list (aka a problem to solve and a list of things your code should do). These will be graded as pass/fail. Either your code meets all the requirements or it does not. Your code should:

- Be a .py script (unless otherwise noted)
- Run without errors
- Represent your own personal work - be unique to you
- Correctly solve the problem: have correct inputs and outputs.
- Be appropriately commented.
- Be correctly named: first_last_#.py
- Be handed in on time, on canvas

If your code is VERY close to meeting all requirements, but you missed something small, you will be given feedback and the option to redo the assignment. There will be a total of 11 programming assignments in this class you must pass 8 to pass with a 2.0 in the class.

iii. **Exams**:

We will have two exams to test your individual knowledge of basic programming.

Exam 1 on Wednesday 2/12 - will cover all the basics of programming - data types, lists, loops, conditional statements, dictionaries, and arrays.
Exam 2 on Wednesday 4/2 - will cover all the intermediate topics - input/output, importing data, while loops, functions, and classes.

Exams will contain 3 parts:

- Part 1 - (multiple choice - canvas) - Understand of vocabulary used in class and basic definitions. Have the ability to look a code and understand what it does or outputs. Identify errors in code.
  You must earn an 80% to pass part 1 (10 points)
- Part 2 - (basic programming) - Construct a piece of working code given an outline (psuedo code) or debug (fix) a piece of given code.
  Graded as pass/fail (5 points)
- Part 3 - (programming) - Construct a piece of working code given only the specifications.
  Graded as pass/fail (5 points)

iii. **Projects**:

Each student will participate in an individual project for the class that solves a problem from a area of their own interest. This could be code that might help you on homework assignments, code that analyzes some data, or even code that helps you with something from your life. You are welcome to be creative (eg. build a small video game - the problem is "I am bored"). Projects can be completed at a variety of levels:

P1 A level 1 project will meet all of the following requirements

- Clearly define the problem being solved; explain it's importance and any background.
- Accepts at least one user input.
- Prints or Saves an output (the solution) that includes either a graphical or tabular component.
- Contains appropriate commenting and uses good Python Style (as defined in class).
- Completes a non-trivial calculation (using loops and/or conditionals).
- Is unique and related to an area of your interest

** A level 1 project should be doable in the last week of classes. It should take about 10 hours to complete. (10 points)

P2 A level 2 project will meet all of the level 1 requirements plus

- Contains more advanced user interactions - accepts multiple inputs or imports multiple files as appropriate.
- Contains saves a report of the final data in both tabular and graphical form as appropriate.
- Uses more advanced looping and conditional statements.
- Uses functions and modules to organize the code.

** A level 2 project should be doable in the last two weeks of class. It should take about 20 hours to complete. (15 points)

P3 A level 3 project will meet all of the level 2 requirements plus

- Programmer meets with Joanna at least once to brainstorm.
- Uses classes to define data types used in the program.
- Does one of: Advanced data or graphical processing or advanced user interaction GUI or completes advanced testing and algorithm analysis.
- Learns something that was not directly covered in class.

** A level 3 project must be started well before the end of the semester. It should take 30+ hours to complete. (20 points)

You will submit an initial project proposal on March 10th - this will be a short statement about what level you are planning on for your final project and an area of interest. It's okay if your ideas change as we cover more content. You will submit a final project proposal on March 24th - this will outline the entire scope of your project. If you are planning on a Level 3 project you should also submit your current code with the final proposal and make sure that you have had a meeting with Joanna well before this date. If revisions are needed to your project plans you will resubmit a final project proposal on April 7th.

You must submit a final project and final project proposal to pass the class.

Grading Criteria

To pass this class earning a grade of 2.0 you must meet the basic course learning objectives. This can be shown by passing 8 out of the 11 programming assignments, submitting 16 out of the 23 practice problem sets, earning at least 10 points on each of the two exams, and successfully completing a Level 1 project. Students have the opportunity to show advanced understanding or mastery of the course concepts by completing more advanced projects, passing all programming assignments, and earning 15 points on both exams. See the table below for how to earn each grade. You must check each box in the row to earn the grade listed. For example, you cannot earn a 4.0 in the class if you miss more than 2 classes.

Grade	Practice (1pt each)	Programming Assignments (2pts each)	Exams (sum of points)	Final Project (20 points) + Level	Attendance	Total Points
4.0	20	20	55	17 or more P3	missed 2 or less =10	122
3.7	18	20	50	12 or more P3	missed 2 or less = 10	110
3.3	18	20	45	17 or more P2	missed 4 or less = 8	108
3.0	18	18	40	12 or more P2	missed 4 or less = 8	96
2.7	18	18	35	17 or more P1	missed 6 or less = 4	92
2.3	18	16	30	12 or more P1	missed 6 or less = 4	30
2.0	16	16	20	10 or more P1	missed 8 or less = 2	64
1.7 and below	less than 16	less than 16	less than 20	less than 10 on project	missed more than 8 = 0	less then 64

Course Policies

Communication

- The most reliable way to reach me is by email. Please note that my normal working hours are
  Monday 12-8pm
  Tuesday 9-5pm
  Wednesday 12-8pm
  Thursday 12-8pm
  Friday 9-5pm
  I do not respond to emails outside of my working hours or on weekends, except in an emergency.
- I try to check my chat on teams multiple times a day during my work hours. This is a good place to have a quick chat or even set up a quick video meeting. I am happy to schedule virtual appointments during our outside of office hours.
- It is important that you communicate throughout the semester. Let me know if there are ways I can improve your learning in the class. If you are going to miss class or need an extension on the homework, the earlier you tell me the better!

COVID-19 Health Protocols

- In an effort to keep the classroom community safe and healthy, please follow the guidelines outlined here:
  - Wearing a mask is voluntary.
  - Do not come to class if you feel ill or have been exposed to someone who is ill.
- In any case of the above, e-mail me directly to reconcile any class work and/or attendance issues. Please contact me if you have any concerns as to your health needs and goals for the semester.

University Policies

Academic Honesty

The University of Redlands enforces strict standards as regards academic honesty, and students may be dismissed for breaches of these standards. To learn these standards, please look at the relevant section of the University Course Catalog, "Academic Honesty ". See in particular Section III, Paragraph B, which states that it is an offense to offer "as one's own work the words, ideas, or arguments of another person without appropriate attribution by quotation, reference, or footnote."
In light of this, please note that:

- intentional plagiarism—i.e. piecemeal or wholesale appropriation of text from one or more printed or internet source—will result in a fail grade for the course.
- plagiarism by default—i.e. uncredited adoption of ideas from source texts due to carelessness in citation—will result in a fail grade for the project.

Artificial Intelligence: There is no tolerance for the use of generative artificial intelligence in place of individual work and thinking in this course. All work is to be considered a student's own. Any violation of that will result in a failing grade for the work.

If you are still in any doubt about what constitutes plagiarism, please ask me before you undertake any written work. If you do not ask, I shall not accept a plea of ignorance after the fact.

Office of Equity and Title IX

In order to provide a safe and equitable learning environment for all students, faculty, and staff, discrimination, harassment, retaliation, sexual misconduct, and sexual harassment (including sexual assault, dating or domestic violence, and stalking) are not tolerated at the University of Redlands. The University prohibits unlawful discrimination or harassment (as defined in the Policy Prohibiting Discrimination, Harassment, Sexual Misconduct, and Retaliation on the basis of age, color, race, ethnicity, national origin, ancestry, sex, marital status, pregnancy, status as a complaining party of domestic violence, sexual orientation, gender, gender identity or expression, physical or mental disability, genetic information, religion/creed, citizenship status (except to comply with legal requirements for employment), military/veteran status, or any other characteristic protected by law. If you or someone you know has experienced or experiences any of these behaviors, know that you are not alone. You can contact the Office of Equity and Title IX for reporting options, supportive measures, and resources to support you.

All faculty and staff at the University of Redlands are considered "Responsible Employees," which means that if you tell me about a situation involving any of the above, I must report the matter to the Office of Equity and Title IX. Although I make that report, you are in control of how you would like to proceed, including whether, or not, you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of reporting options available to you and have access to the support and resources you need. To report an incident, you can:

- Contact the Director of Equity & Title IX, Corinne Vorenkamp, at titleix@redlands.edu or 909-748-8916
- Report online.

You can also report to local law enforcement at

(909) 798-7681, ext. 1. If you are ever in immediate danger, please call 911 or email/text 911@redlandspolice.org if you cannot call.

If you wish to speak to someone confidentially (meaning not connecting with the Office of Equity and Title IX Office), you can contact the following resources:

- Campus: Counseling Service: 909-748-8108 or 24-Hour Crisis Line: 909-748-8960 or Chaplain's Office: 909-748-8368
- Community: Partners Against Violence, 24-hour sexual assault crisis line: 909-885-8884
- Option House. 24-hour dating/domestic violence crisis line: 909-381-3471
- Online chat: https://www.loveisrespect.org/

For more information, please visit:
www.redlands.edu/titleixandequity.

Disabilities and Accommodations

If you are a student with a disability that qualifies for academic accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act, contact Academic Success and Accessibility (ASA). ASA is located on the ground floor of the Armacost Library, down the hall from the Jones Computer Center (past the restrooms). You can reach the office at 909-748-8069 or asa@redlands.edu.

Please let me know by the end of the second session at the latest if you have a learning or physical disability which will require accommodation.

Counseling Center

The Counseling Center provides free and confidential short-term mental health services, including individual therapy, group therapy, single session therapy, consultations, and urgent appointments to all students with in-person or virtual options. Our Counseling Center is committed to inclusivity and to providing a supportive space for everyone. Please call 909-748-8108 to schedule an appointment. If a student is in crisis, please call 909-748-8960 for the 24/7 mental health crisis line. For more information, see:

https://www.redlands.edu/student-affairs/health-and-psychological-services/counseling-center/

Another option for individual therapy for all students is TimelyCare which provides virtual therapy immediately (Talk Now) or up to 12 scheduled virtual therapy sessions per year. Students can choose their therapist from a list of providers for the scheduled therapy option.

Conflict Resolution Center

Experiencing a conflict? Whether it's with a friend, roommate, another member of a student organization, or faculty or staff member, conflicts happen. Learning to navigate conflicts is important to success in virtually any field, and a vital step in being a part of a community and having healthy, meaningful relationships with others. See https://sites.redlands.edu/conflict-resolution-center/student-resources/ for more information.

The Care Team

The University CARE Team exists to help provide support and resources to students that are overwhelmed, experiencing significant distress, or possibly present some risk to themselves or others. As a faculty member, I may reach out to students about whom I am concerned to talk individually, and/or refer them to the CARE Team. If you have concerns about a fellow student, consider sharing your concern with the CARE Team via their online form. This is part of who we are as a caring, proactive community where we all look out for one another. Additionally, if you feel that you or someone else needs immediate mental health support, the University has a 24/7 mental health crisis line at 909-748-8960, and the Timely Care app, which offers on-demand emotional care. Both services connect to a live, licensed counselor.

Aditional Resources

If you are in need of additional resources, please refer to the available programs below.

Book Lending Program

The Book Lending Program is an initiative to ensure the academic success of First-Generation students (students who are the first to go to college in their families who meet a particular estimated family contribution [EFC] level). Funded through alumni donations, this program provides books and other classroom materials, when needed, for First-Generation students who could not otherwise afford to purchase them. Books are returned at the end of the course, to be used by other First-Generation students the next semester. The program works alongside the Library and faculty members to ensure the availability of books and classroom materials. For more information, click the link above or contact blp@redlands.edu.

Emergence Student Loans

Student Financial Services (SFS) administers a short-term, no-interest loan fund to assist students experiencing an emergency or cash-flow problem. Except in unusual circumstances, these loans do not exceed $200 and are billed to the student's account. Evidence of repayment ability is a prerequisite for all short-term loans made to students. Students are not eligible for more than one emergency student loan per term. Contact: SFS@redlands.edu or x8047

ASUR Student Emergency Fund

The Student Emergency Fund was established by the Associated Students of the University of Redlands (ASUR), funds are available to students who are unable to meet immediate, essential expenses due to temporary hardship related to an unforeseen or emergency situation. Our goal is to provide flexible assistance in a timely manner to help students continue successfully in school. The distribution of funds is agreed upon by committee comprised of representation from Student Affairs, ASUR Cabinet, and Student Financial Services. Awards are not considered loans and do not require repayment. Some funds may be considered income and are therefore subject to federal taxes. The average award ranges between $25 and $400. Students may only be awarded assistance from the ASUR Student Emergency Fund once during their undergraduate career at the University of Redlands. Go to ASUR Emergency Fund App | Presence.

Student Affairs Discretionary Fund

These endowed funds in Student Affairs can be used to support student success and remove impediments that otherwise may cause the student to stop or leave school. To utilize this fund, divisional leadership should be made aware of the student in dire need of financial support. This support can be anything from personal expenses, such as utility bills, gas money, emergency trips home due to family tragedy, off-campus counseling, and other medical costs, and occasionally mental health assessment expenses. Students receive grants based on their financial need. Contact: student_affairs@redlands.edu.

Student Food Support Pantry

The Student Food Support Pantry is a resource available to all established full and part-time University of Redlands students facing food insecurities. The Pantry is located on the north side of North Hall. This space is an open, no-questions-asked space with dried and canned goods, and non-perishable items, as well as seasonal fresh produce from our sustainable farm and limited refrigerated goods. Food for this distribution is provided in partnership with Feeding America Riverside and San Bernardino. It is also funded through private donations, ASUR, and the Office of Community Service Learning. For more information, please contact SURF@redlands.edu.

Course Schedule

Schedule is subject to change as we progress through the semester. You will be notified of any changes in class.

Introduction to Python Programming – Spring 2025					
DATE	WEEK	DAY	Lecture Topic	Homework Due – Midnight	Other Notes
01/08/25	1	Wednesday	Intro to Python, Jupyter, and PyCharm Your first program.		**Install Anaconda and get Python Running**
01/09/25	1	Thursday	LAB – make sure your computer is working!		
01/13/25	1	Monday	Simple Data Types and Numeric Expressions (Numpy) Helpful math: basics, mod, roots, etc Writing Comments		
01/15/25	1	Wednesday	LAB		It's okay if this is hard a first, come get help!
01/16/25		Thursday	Lists	Program 1 Due Jan 17	
01/20/25	**2**	**Monday**	**No Class – Martin Luther King Jr Holiday**		
01/22/25	2	Wednesday	Creating, and Slicing lists. Definite Loops and Iterative Execution		
01/23/25	2	Thursday	LAB	Program 2 Due Jan 24	Seriously, it's okay if this is hard, but I really want you to come get some help!
01/27/25	3	Monday	Conditional Statements, Comparisons, and Boolean Expressions		
01/29/25	3	Wednesday	Conditional Statements Continued. Selective Execution		
01/30/25	3	Thursday	LAB	Program 3 Due Jan 31	
02/03/25	4	Monday	Dictionaries		
02/05/25	4	Wednesday	Input Statements and While Loops		
02/06/25	4	Thursday	Lab	Program 4 Due Feb 7	Start Preparing for Exam 1
02/10/25	5	Monday	Applied Projects – Examples.		
02/12/25	5	Wednesday	Exam 1		
02/13/25	5	Thursday	Exam 1		
02/17/25	6	Monday	Input and Output: reading and writing text files, mapping data, and importing images		How did exam 1 go? It's not too late to get some help.
02/19/25	6	Wednesday	Importing and exploring data (Pandas)		
02/20/25	6	Thursday	LAB	Program 5 Due Feb 21	
02/24/25	7	Monday	Review of Input/Output, Loops, Breaks, Dictionaries, Pandas etc.		Start thinking about your final project area of interest.

02/26/25	7	Wednesday	Functions – build your own!		
02/27/25	7	Thursday	LAB	Program 6 Due Feb 28	
03/03/25	8	Monday	SPRING BREAK		
03/05/25	8	Wednesday	SPRING BREAK		
03/06/25	8	Thursday	SPRING BREAK		
03/10/25	9	Monday	Storing your functions as Modules		**Initial Project Proposals Due**
03/12/25	9	Wednesday	More practice with functions and modules		
03/13/25	9	Thursday	LAB	Program 7 Due Mar 14	
03/17/25	10	Monday	Introduction to web scraping using Beautiful Soup		Don't forget to sign up for Fall Classes: DATA 101 and DATA 201 CS110 – Java Programming
03/19/25	10	Wednesday	More advanced web scraping topics		
03/20/25	10	Thursday	LAB	Program 8 Due Mar 21	Decide: What do you want to do for your final project. Do some research, get some data, find a tutorial.
03/24/25	11	Monday	Introduction to GeoPandas – interaction with spatial data.		**Final Project Proposals Due**
03/26/25	11	Wednesday	More practice with GeoPandas, Pandas, and large data sets.		
03/27/25	11	Thursday	LAB	Program 9 Due Mar 28	Start preparing for Exam 2 Withdraw deadline is 3/16
03/31/25	12	Monday	Applied Projects – Examples		
04/02/25	12	Wednesday	Exam 2		
04/03/25	12	Thursday	Exam 2		
04/07/25	13	Monday	Classes, Inheritance, and Standard Libraries.		**Final Project Proposal Revisions (if needed) Due**
04/09/25	13	Wednesday	User defined data types.		
04/10/25	13	Thursday	LAB	Program 10 Due Apr 11	Start working on your final project
04/14/25	14	Monday	Work on your final projects		
04/16/25	14	Wednesday	Work on your final projects		
04/17/25	14	Thursday	LAB	Final Projects Due Apr 18th	
04/18/25			FINAL PROJECTS DUE		