Class Introduction

Hi there, I'm Bonnie Hurwitz. Welcome to Biosystems Analytics. In this class, we will learn to code in Python by creating programs that are documented, tested and reproducible. Python is used throughout the IT industry as well as in other fields like engineering, biology, and beyond! Because of that Python is a fantastic tool to have in your toolkit and opens up an incredible amount of opportunity.

I am an Associate professor at the University of Arizona, and I use Python in my daily life to analyze genomic datasets and understand more about the bacteria and viruses that live, on, in, and around us. Some of these microbes are only known through their DNA, and the only way to access and understand these large-scale data is to use Python (and a super computer) to compare and contrast microbiomes from different environments or disease states. I have been working in the world of genomics for the last 25 years, on project ranging from the human genome to the Earth microbiome. And in every project, I have used programming to solve problems and make new discoveries. How will you use Python? I would love to hear more about it in the class discussion forum!

I'm really excited to be your instructor for this course. This course was co-developed by me and Ken Youens-Clark, a professional programmer and the author of the book we will be using throughout this class called Tiny Python Projects. Throughout this class, you're going learn from both Ken and I through instructional videos, coding examples, and assignments that will teach you the basics of Python programming. So, what's ahead? By the time you finish the last video of this course, you'll be able to create programs in Python, solve real-world problems, and manipulate files on your computer. Here is the roadmap:

Every program we write will use command-line arguments, and we will start off by teaching you how to create your first Python program and how to use a Python module called argparse to handle all of the command-line arguments for you. Every progam is also tested. And every example and coding assignment comes with a "test" that allows you to check if your code is doing what it should and is correct. That means you will be able to automatically check your code, to be sure you are passing all of the tests and getting 100% on your coding assignment. We will do this using another python module called pytest.

In weeks 3, 4, and 5 we will begin to learn basic Python structures like strings, lists, and dictionaries. We will learn about these through fun examples where you will learn how to change and manipulate data in these Python structure.

In week 6 and 7, we will dive into working with files for input and output, and explore how we can use Python to process input and output streams.

We'll kick off week 8 by learning how to use regular expressions to find patterns in text. This is a powerful way to change and update data in your files. For example, you might need to fix a mis-spelled word in some text. I can't tell you how many times I have used regular expressions to "clean up" my data and get it ready for processing.

After spring break in week 10, we will introduce the random module and show you how to control and test random events.

Then in weeks 11 and 12 we will talk more about algorithm design and how to parse files with comma-separated values and create beautifully formatted tables.

In the last few weeks, we will start writing more complex real-world programs that will teach you more about higher order functions.

And to finish, we'll put all of this together for the final project using the knowledge that you've acquired to process data. This lets you experience real world coding scenarios where you will need to write code to solve problems.

Remember that these complex topics and videos might not "sink in" the first time, and it is completely fine to rewatch the videos. This is totally natural, take your time. Also, remember, that you can you use the slack discussion forum to connect with me and your fellow students to ask any questions that you might have. We're about to go on a fun and fascinating journey together into Python. Let's get started.