PH526x: Using Python For Research - Course Syllabus

Course Instructor

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Course Description

This course bridges the gap between introductory and advanced courses in Python. While there are many excellent introductory Python courses available, most typically do not go deep enough for you to apply your Python skills to research projects. In this course, after first reviewing the basics of Python 3, we learn about tools commonly used in research settings.

Using a combination of a guided introduction and more independent in-depth exploration, you will get to practice your new Python skills with various case studies chosen for their scientific breadth and their coverage of different Python features.

What you'll learn

- Python 3 programming basics (a review)
- Python tools for research applications (e.g., NumPy and SciPy modules)
- How to apply Python research tools in practical settings

Research

HarvardX pursues the science of learning. When you participate in this course, you will also participate in research about learning. Read our research statement to learn more.

Course Structure

This course is self-paced. All material is available now, and you can progress through the material at your own pace.

Grading

There are 3 different graded components of the course:

1. **Comprehension Check** (CC) assessments. These occur after most videos, and are worth **30%** of your grade. Your lowest CC score will be dropped.
2. **Homework** (HW) assessments. The **ten** homeworks are worth **55%** of your grade. Weeks 1 and 2 have **one** homework assignment each. Weeks 3 and 4 have **three** homework assignments each. Week 5 has **two** homework assignments.
3. **Final Project** (FP). The Final Project is open to Verified learners only and is worth **15%** of your grade.

All other components of the course, such as the self-assessment pre-quiz and the discussion boards, are not for credit.

Certification

In order to receive a Verified Certificate, you must sign up for a Verified Certificate and earn a passing grade of at least **70%**.

COURSE OUTLINE

Welcome and Introduction

- Introduction and Welcome
- Pre-Quiz Self-Assessment
- Important Pre-Course Survey

Week 1: Basics of Python 3

- Week 1 Overview
- Part 1: Objects and Methods (Comprehension Check)
- Part 2: Sequence Objects (Comprehension Check)
- Part 3: Manipulating Objects (Comprehension Check)
- Week 1 Homework (Homework)

Week 2: Python Libraries and Concepts Used in Research

- Week 2 Overview
- Part 1: Scope Rules and Classes (Comprehension Check)
- Part 2: NumPy (Comprehension Check)
- Part 3: Matplotlib and Pyplot (Comprehension Check)
- Part 4: Randomness and Time (Comprehension Check)
- Week 2 Homework (Homework)

Week 3: Case Studies Part 1

- Week 3 Overview
- DNA Translation (Comprehension Check)
- Homework: DNA Translation (Homework)
- Language Processing (Comprehension Check)
- Homework: Language Processing (Homework)
- Introduction to Classification (Comprehension Check)
- Homework: Introduction to Classification (Homework)

Week 4: Case Studies Part 2

- Classifying Whiskies (Comprehension Check)
- Homework: Classifying Whiskies (Homework)

- Bird Migration (Comprehension Check)
- Homework: Bird Migration (Homework)
- Social Network Analysis (Comprehension Check)
- Homework: Social Network Analysis (Homework)

Week 5: Statistical Learning

- Week 5 Overview
- Part 1: Linear Regression (Comprehension Check)
- Part 2: Logistic Regression (Comprehension Check)
- Part 3: Random Forest (Comprehension Check)
- Homework: Case Study 7 (Homework)
- Homework: Case Study 7, Part 2 (Homework)

Final Project

The final project is open to Verified learners only.

FAQS

What is the deadline to sign up for a Verified Certificate?

The deadline is listed on your course home page.

How do I earn a certificate?

To earn a certificate, you must sign up for a Verified Certificate by the deadline and earn a grade of at least 70%. When you achieve this score, an option will appear on the Progress page to request a certificate. For more information, click on this link. Caution: the grade that you see on your dashboard reflects your grade at that time you requested the certificate. If you complete more assignments to raise your grade, the grade on your Progress page changes, but the grade listed on your dashboard is not updated.

How do I upgrade to a verified certificate?

Go to your edX Dashboard (by clicking the edX icon at the top left of this page). Under this course, click the "Challenge Yourself!" link. The last day to sign up for a verified certificate is listed on your course homepage.

How long does the course take?

That is up to you! It is 5 weeks of content. Just be aware of the course close date listed on your course homepage!

I am doing well on the assessments, but when I look under "Progress" I have a very low grade...why?

The grade is calculated based on all of the assessments you have completed ***and*** the assessments that you have not completed (edX says you have a "zero" on those assessments **until** you have attempted them). You will see your overall grade move up as you progress through the course.