An 11-week comprehensive program covering Python® language fundamentals and how to use Python for data analysis

Python is a popular and highly versatile programming language used in a variety of business and scientific applications. Most recently, Python’s use in data analysis has flourished, contending only with R as the top language used for transforming and analyzing large datasets.

DePaul University’s Data Science: Programming with Python Program is geared towards IT professionals such as data analysts, data scientists, and computer programmers as well as professionals from other technical, engineering or scientific fields who wish to learn and harness the power of Python. The program covers a comprehensive introduction to the Python language, commonly used packages for accessing web data, and popular Python libraries used for data manipulation, analysis, and visualization.

Classroom lectures and demonstrations will be complemented by reading and programming assignments. The software used in the program is all open-source or is freely available for download.

YOU WILL BE ABLE TO:

- Use Python syntax to write basic computer programs
- Understand the object-oriented principles of Python
- Use common packages to extract data from webpages
- Gain competence in data science methods using Python
- Learn techniques for importing, exporting, cleaning, and transforming data using open-source libraries such as pandas, NumPy, and SciPy
- Use select machine learning algorithms in Scikit-learn to build smart models and make predictions
- Explore the data visualization capabilities of libraries such as Matplotlib, Seaborn, and Folium
# DATA SCIENCE: PROGRAMMING WITH PYTHON PROGRAM

## CURRICULUM

Students in the Data Science: Programming with Python Program are expected to do a considerable amount of work outside of class. Instructors will be accessible in person and through electronic mail.

All work can be done using freely available software.

## FUNDAMENTALS OF PYTHON

Using the interpreter; comments; variables; types; numbers; math; Booleans; logic; strings; lists; slicing; console I/O; control flow; loops; range.

## INTRO TO DATA STRUCTURES

Dictionaries, tuples, and sets, along with their common operators; looping techniques (enumerate, zip); comprehensions (list, dictionary, etc.) in Python; problem-solving.

## FUNCTIONS

Built-in and user-defined functions; function execution model (return values, scope, pass-by semantics, etc.); keyword arguments and variadic positional arguments; functions as objects.

## FUNCTIONAL PROGRAMMING

Functional programming paradigm; higher-order functions through map and filter, and anonymous lambda functions; iterators; generators; decorators and how they can solve common programming problems.

## OBJECT-ORIENTED PROGRAMMING (OOP)

Class objects vs. instance objects; attribute resolution; methods vs. functions; single and multiple inheritance; operator overloading with an emphasis on masquerading as built-in types; hierarchy of exceptions; proper exceptional control flow using try/except/else/finally.

## WEB DATA + PYTHON

Regular expressions; understanding protocols that web browsers use to retrieve documents and which web applications use to interact with Application Program Interfaces (APIs); Hypertext Transfer Protocol (HTTP); sockets; using the Developer Console to explore HTTP; using Python to retrieving web data; parsing web pages.

## WEB DATA + PYTHON (Advanced)

eXtensible Markup Language (XML); XML schema; parsing XML; JavaScript Object Notation (JSON); real-world applications.

## ANALYZING DATA + PYTHON

Python packages for data science; analyzing data; preprocessing data; dealing with missing values; data formatting; data normalization; binding turning categorical variables into quantitative variables; data wrangling.

## MANIPULATING DATA SETS

Using open-source libraries such as Pandas, NumPy and SciPy to load and manipulate datasets.

## MACHINE LEARNING + PYTHON

Using select machine learning algorithms in Scikit-learn to build smart models and making predictions.
DATA VISUALIZATION + PYTHON

Data visualization libraries such as Matplotlib, Seaborn, and Folium; creating plots, histograms, bar charts, pie charts, scatter plots, box plots, and bubble plots with Matplotlib; tools to create waffle charts and word clouds; regression plots in Seaborn; geospatial data and maps in Folium.

GENERAL INFORMATION

ADMISSION
The program is geared towards IT professionals such as data analysts, data scientists, and computer programmers as well as professionals from other technical, engineering, or scientific fields who wish to learn and harness the power of Python. Applicants should have at least six months’ experience programming in a modern language. It is also helpful, but not required, to have an understanding of statistics.

A substantial commitment of time is required for this intensive course of study. Acceptance into the program will be determined by the admissions committee on the basis of an applicant's overall qualifications, including work history and educational background.

FACILITIES
To promote the learning process, the Institute maintains special-purpose laboratories as well as dedicated classrooms equipped with state-of-the-art audio/visual equipment.

In addition, the college’s unique Course OnLine (COL) technology allows students to replay classes over the Internet. COL captures and replays several components of the classroom experience—audio, video, PC screen, and whiteboard—and incorporates them into one interface to provide an innovative rebroadcast system.

CLASSES
The Institute offers one section of the program each quarter. Classes meet one evening per week.

FACULTY
The faculty consists of a team of instructors from the College of Computing and Digital Media and experts from industry. Faculty will be available throughout the program both in person and through electronic mail.
The college, through its School of Cinematic Arts, School of Computing, and its School of Design, offers a variety of programs at the undergraduate and graduate levels. Over 3,000 students are enrolled in the college's bachelor's programs and about 2,000 students are enrolled in the master's and Ph.D. programs making the college's graduate program one of the largest in the country. The college offers close to 400 courses each quarter, many in the evening, and primarily in the Loop and Lincoln Park Campuses. Most of the degree programs are also available exclusively online.

Offerings at the undergraduate level include:
- Animation B.A. / B.F.A.
- Computer Science B.S.
- Cyber-Physical Systems Engineering B.S.
- Cybersecurity B.S.
- Data Science B.S.
- Film and Television B.A. / B.F.A.
- Game Design B.S.
- Game Programming B.S.
- Graphic Design B.F.A.
- Information Systems B.S.
- Information Technology B.S.
- Interactive and Social Media B.S.
- Math and Computer Science B.S.
- Network Engineering and Security B.S.
- User Experience Design B.S.

Offerings at the graduate level include:
- Animation M.A.
- Applied Technology M.S.
- Business Information Technology M.S.
- Computation Finance M.S.
- Cybersecurity M.S.
- Data Science M.S.
- Digital Communication and Media Arts M.A.
- E-Commerce Technology M.S.
- Experience Design M.A.
- Film and Television M.S.
- Game Programming M.S.
- Health Informatics M.S.
- Human-Computer Interaction M.S.
- Information Systems M.S.
- Network Engineering and Security M.S.
- Product Innovation and Computing M.S.
- Software Engineering M.S.
- J.D./M.S. in Computer Science Technology

Master's of Fine Arts
- Animation
- Creative Producing
- Documentary
- Film and Television Directing
- Game Design
- Screenwriting

Ph.D. in Computer and Information Sciences
Ph.D. in Human Centered Design

The Institute for Professional Development was formed by the college in 1984 to assist both individuals and businesses in keeping pace with the rapid development of computer technologies. The Institute currently offers a variety of intensive certificate programs in these areas:

- Advanced SQL
- Big Data and NoSQL
- Big Data Using Hadoop
- Big Data Using Spark
- Cloud Computing Technologies
- Cybersecurity Risk Management
- Data Science for Business
- Data Science: Programming with Python
- Fundamentals of R
- Fundamentals of Software Testing
- Incident Response and Digital Forensics
- Introduction to Artificial Intelligence and Deep Learning
- Introduction to SQL
- iOS Developer
- Java™ Developer
- Modern Information Technology
- Modern .NET Web Development
- SQL Server® Business Intelligence
- SQL Server® Database Administration
- Technology and Innovation
- Web Development with JavaScript and HTML5

APPLICATION PROCEDURE:
You do not have to be an existing DePaul student to take this certificate program. All interested parties must apply for admission. Prospective students may complete the online application and pay the (non-refundable) $40.00 application fee online during the application process. Alternatively, prospective students may print, complete and return the printable application via mail or email (ipd@cdm.depaul.edu), and mail the (non-refundable) $40.00 application fee (check or money order made payable to DEPAUL UNIVERSITY) to:

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Institute for Professional Development
243 S. Wabash Avenue, Room 301
Chicago, IL 60604-2300

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