

Github: https://github.com/ReneStander/BMG_Python_Course

Introduction to Python Programming

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16 & 17 September 2024

BILL & MELINDA
GATES *foundation*

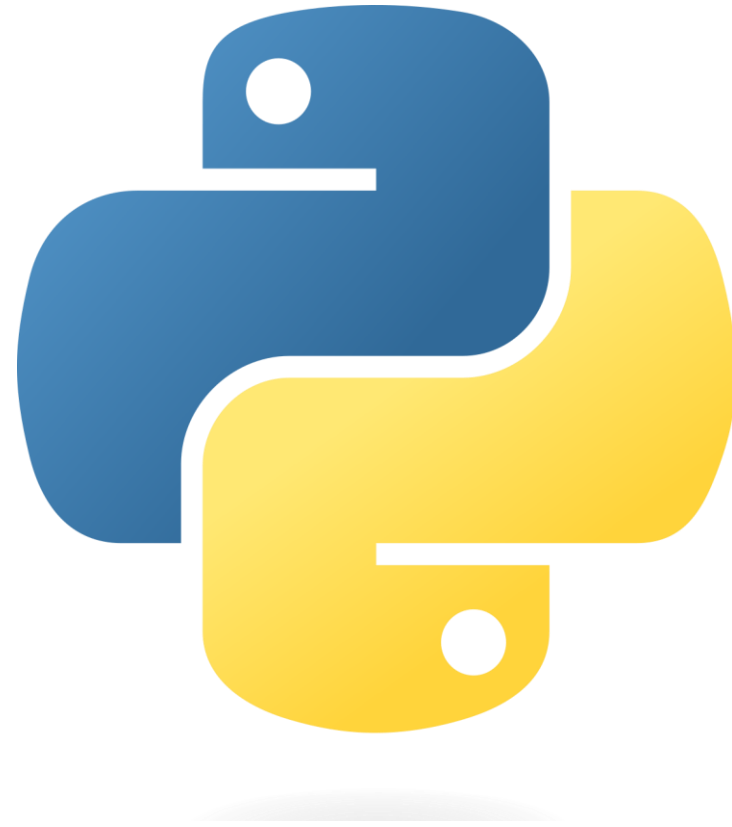


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Outline

1. Introduction to Python
2. Basics of the programming language
3. Data manipulation
4. Data visualization
5. Basic statistical analysis



Resources

- Downey, A.B., 2012. *Think python*. O'Reilly Media, Inc.
<https://alldowney.github.io/ThinkPython/#>
- Adhikari, A., DeNero, J. and Wagner, D., 2022. *Computational and Inferential Thinking: The Foundations of Data Science*, Second edition, University of California, Berkeley.
<https://inferentialthinking.com/>

1. Introduction to Python

Why Python?

- Mature programming language.
- Has excellent properties for newbie programmers.
- Currently one of the most flexible programming languages.
- Has a large ecosystem of libraries making it easy for Data Scientists.



Applications developed with Python you may know...



NETFLIX



Running Python in Google Colab

Google Colab

- Hosted **Jupyter Notebook** service.
- Required **no** hardware or software to be installed on your device.
- Provides free access to computing resources such as GPUs.

<https://colab.google/notebooks/>

Running Python in Google Colab

The screenshot shows the Google Colab web interface. At the top, the file name "Untitled1.ipynb" is displayed next to a star icon. A green box labeled "Name your file" has an arrow pointing to the star icon. Below the file name is a menu bar with options: File, Edit, View, Insert, Runtime, Tools, Help, and a link for "All changes saved". On the right side of the top bar, there are icons for "Comment", "Share", a settings gear, and a user profile picture. A green box labeled "You can share the file with your collaborators" has an arrow pointing to the "Share" icon. In the center, there is a large text area with a play button icon and the text "Start coding or generate with AI.". A green box labeled "You can add code chunks and text boxes" has an arrow pointing to the "+ Code" and "+ Text" buttons located above this text area. On the right side of the text area, there is a toolbar with icons for "Connect", "Gemini", and various editing actions like undo, redo, and delete. A green box labeled "You can share the file with your collaborators" also has an arrow pointing to the "Share" icon in the top right corner.

co Untitled1.ipynb ☆

File Edit View Insert Runtime Tools Help [All changes saved](#)

+ Code + Text

Start coding or generate with AI.

Comment Share ⚙️ 👤

Connect Gemini

↑ ↓ ↶ ↷ ⚙️ 📄 🗑️ ⋮

Name your file

You can add code chunks and text boxes

You can share the file with your collaborators

Running Python in Google Colab

The image shows the Google Colab interface. At the top, the file name is 'Untitled1.ipynb'. The menu bar includes File, Edit, View, Insert, Runtime, Tools, and Help. The 'Runtime' menu is open, displaying various options with their corresponding keyboard shortcuts. The 'Change runtime type' option is highlighted with a green box. To the right of the menu, the status bar shows 'Connected' and 'Gemini'. Below the menu, a dialog box titled 'Change runtime type' is open. It features a 'Runtime type' dropdown menu set to 'Python 3', which is also highlighted with a green box. Below this, the 'Hardware accelerator' section shows five options: CPU (selected with a blue radio button), T4 GPU, A100 GPU, L4 GPU, and TPU v2-8. At the bottom of the dialog, there is a link to 'Purchase additional compute units' and buttons for 'Cancel' and 'Save'.

Untitled1.ipynb ☆

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

Start coding or

Run all Ctrl+F9

Run before Ctrl+F8

Run the focused cell Ctrl+Enter

Run selection Ctrl+Shift+Enter

Run after Ctrl+F10

Interrupt execution Ctrl+M I

Restart session Ctrl+M .

Restart session and run all

Disconnect and delete runtime

Change runtime type

Manage sessions

View resources

View runtime logs

Comment Share

Connected Gemini

Change runtime type

Runtime type

Python 3

Hardware accelerator ?

☒ CPU ☐ T4 GPU ☐ A100 GPU ☐ L4 GPU

☐ TPU v2-8

Want access to premium GPUs? [Purchase additional compute units](#)

Cancel Save

Running Python in Google Colab

The screenshot displays the Google Colab web interface. On the left, the 'Files' sidebar is open, showing a file explorer with a folder named 'sample_data'. The main area is a code editor with a prompt to 'Start coding or generate with AI.' The top right corner shows resource usage for RAM and Disk, and a 'Gemini' AI tool icon. The bottom status bar indicates 'Connected to Python 3 Google Compute Engine backend'.

Files

sample_data

+ Code + Text

Start coding or generate with AI.

RAM
Disk

Gemini

Disk 74.89 GB available

Connected to Python 3 Google Compute Engine backend

Installing Python

1. Download Anaconda navigator. <https://www.anaconda.com/download>



2. Access the Python IDE, **Spyder**, through the Anaconda navigator.



Fundamental Python Libraries for Data Scientists


- **NumPy:** Provides support for multidimensional **arrays with basic operations on them** and useful linear algebra functions.
- **SciPy:** Provides a collection of **numerical algorithms** and domain-specific toolboxes, including signal processing, optimization and statistics.
- **Matplotlib:** Enables **data visualization**.
- **Pandas:** Provides high performance **data structures** and data analysis tools.
- **Scikit-Learn:** Offers simple and efficient tools for **common tasks in data analysis** such as classification, regression, clustering, and many more...





Coding scripts for this course




Github:



https://github.com/ReneStander/BMG_Python_Course



Coding scripts for this course


 **BMG_Python_Course** Public

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 main  1 Branch  0 Tags


  Code

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Created using Colab

2 minutes ago

 BMG_Python_Workshop_Intro+_Basics.ip...

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25 minutes ago

 RacingGameData.csv

Add files via upload

23 minutes ago

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Coding scripts for this course

Files

main

Go to file

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ReneStander Created using Colab be581c3 · 26 minutes ago History

Preview Code Blame 1699 lines (1699 loc) · 103 KB Raw Copy Download Edit

Open in Colab

Introduction to Python workshop

Dr Rene Stander

16 September 2024

Sources:

- Downey, AB., 2012. Think Python, O'Reilly Media, Inc. (<https://allendowney.github.io/ThinkPython/>)
- Adhikari, A., DeNero, J. and Wagner, D., 2022. Computational and Inferential Thinking: The Foundations of Data Science, Second edition, University of California, Berkeley. (<https://inferentialthinking.com/chapters/intro.html>)

Coding scripts for this course

The screenshot shows a Google Colab notebook interface. At the top, the title bar reads 'BMG_Python_Workshop_Intro+_Basics.ipynb' with a menu bar (File, Edit, View, Insert, Runtime, Tools, Help) and a 'Share' button. Below the title bar, a toolbar contains '+ Code', '+ Text', and a 'Copy to Drive' button (highlighted with a green box). To the right of the toolbar is a 'Connect' button (also highlighted with a green box) and a 'Gemini' button. A dropdown menu is open below the 'Connect' button, showing options for connecting to different backends. The main content area of the notebook is titled 'Introduction to Python workshop' and is authored by 'Dr Rene Stander' on '16 September 2024'. It lists two sources: 'Downey, AB., 2012. Think Python, O'Reilly Media, Inc. (<https://alldowney.github.io/ThinkPython/>)' and 'Adhikari, A., DeNero, J. and Wagner, D., 2022. Computational and Inferential Thinking: The Foundations of Data Science, Second edition, University of California, Berkeley. (<https://inferentialthinking.com/chapters/intro.html>)'. Below the sources, there is a section titled 'Introduction to Python' with a sub-section 'Check the Python version and the installed packages'. This section contains a code cell with the following code:

```
[ ] # Python version\n\n!python --version
```