



Introduction to Python

for applications to biomedical industries

BME 6303 | CRN 19454 | 3 credits

Asynchronous Learning | Lectures & Assignments Available Online

Office Hours, Mondays, 2:30 pm Central

QutubLab.org/python



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Office Hours, Mondays, 2:30 pm Central or by appointment

What does this course offer?

After completing the course, students will have the foundational background to be able to design their own programs, mine public biomedical data sources, and tackle a range of problems in biology and bioengineering using Python.



Why learn Python?

- Python is the **most in-demand programming language by employers** (*Source: IEEE Spectrum*).
- Python's utility across medical centers, the tech industry (e.g., *Google, Amazon*), and academia stems from its versatility, ease of use, and its open-source structure.



“Computer programming for everyone”

- Python sprung from Dutch programmer Guido van Rossum’s holiday “stay-at-home” hobby >30 yrs ago
- Goals of Python (from Guido’s DARPA proposal):
 - “An easy and intuitive language just as powerful as major competitors
 - Open source, so anyone can contribute to its development
 - Code that is as understandable as plain English
 - Suitability for everyday tasks, allowing for short development times”

What do I need for the course?

- A computer with **reliable internet access** & ability to download >300MB programs
- **Willingness to learn** & struggle in learning
 - The class is at the level of every student in the sense that the semester project / programs can range from very simple to as complex and sophisticated as desired
- **An interest in math and computing**

What do I need for the course?

- Access to websites
 - **UTSA's Blackboard** – included with course
 - **Python.org** - free
 - **PyCharm** or other Editor – free
 - **W3Schools.com/python** - free
 - **zyBooks.com** –
 - Optional albeit helpful (downside, \$77 subscription)
 - Sign in or create an account at learn.zybooks.com
 - Enter zyBook code: [UTSABME6303Fall2020](#)

What do I not need?

- Extensive programming background
- Python experience
- Commercial software



Logistics 101: Reading References

New to programming?

<https://wiki.python.org/moin/BeginnersGuide/NonProgrammers>

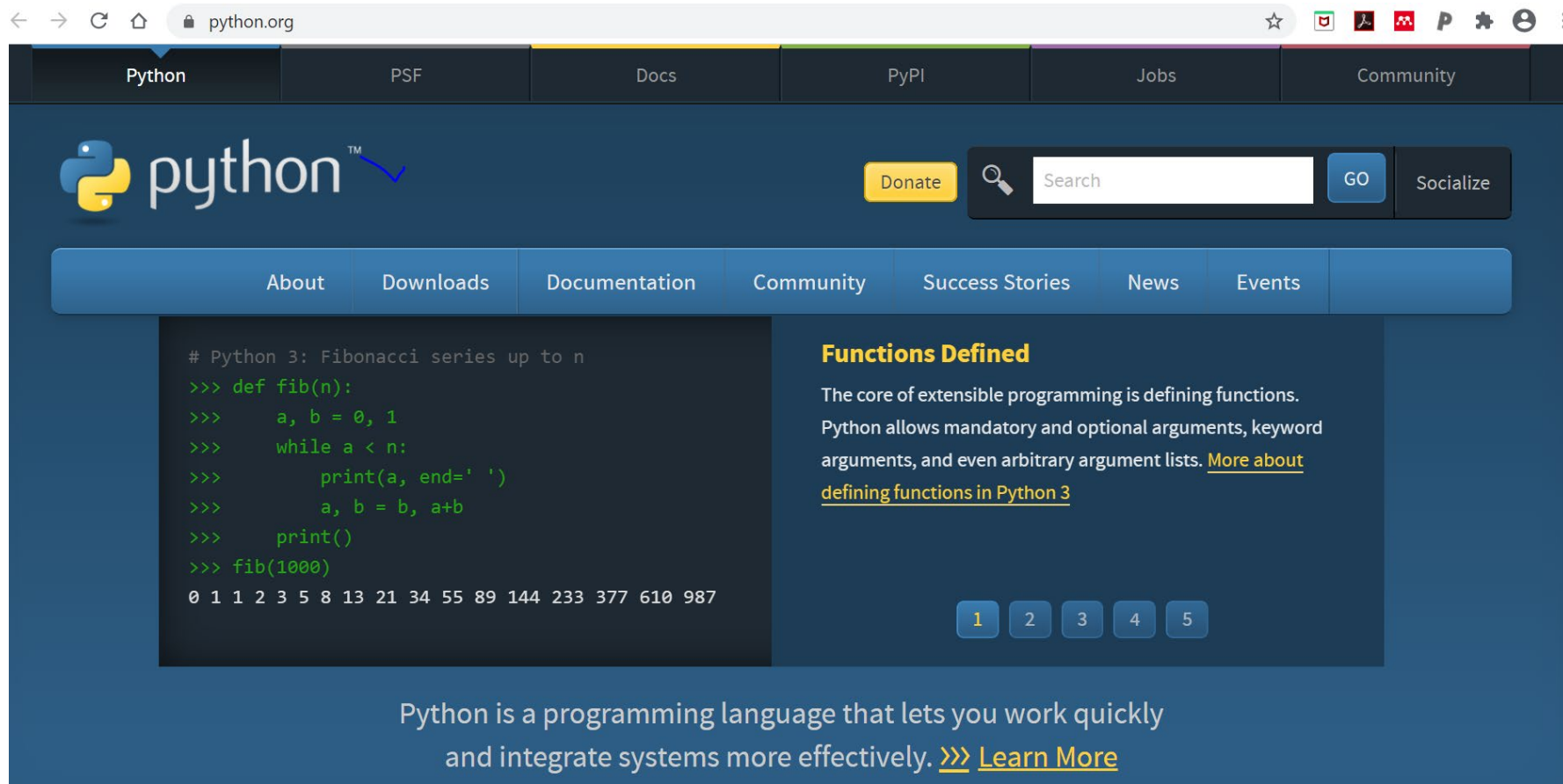
Programming background?

<https://wiki.python.org/moin/BeginnersGuide/Programmers>



Logistics 101: Getting Started

1. Download Python @ the website **www.python.org**





Donate

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Download

Download Python

Looking for Python
Linux/UNIX, Mac OS

Want to help test d
Docker images

Looking for Python

- All releases
- Source code
- Windows
- Mac OS X
- Other Platforms
- License
- Alternative Implementations

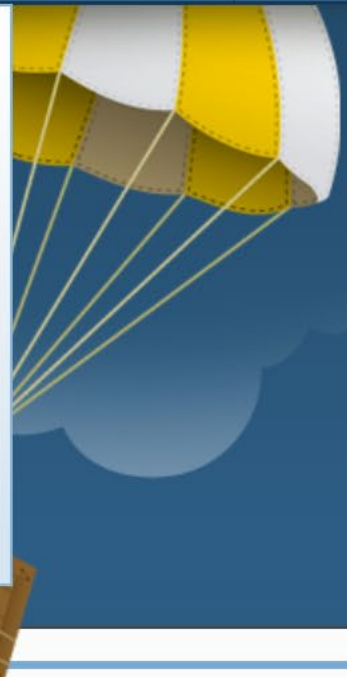
Download for Windows

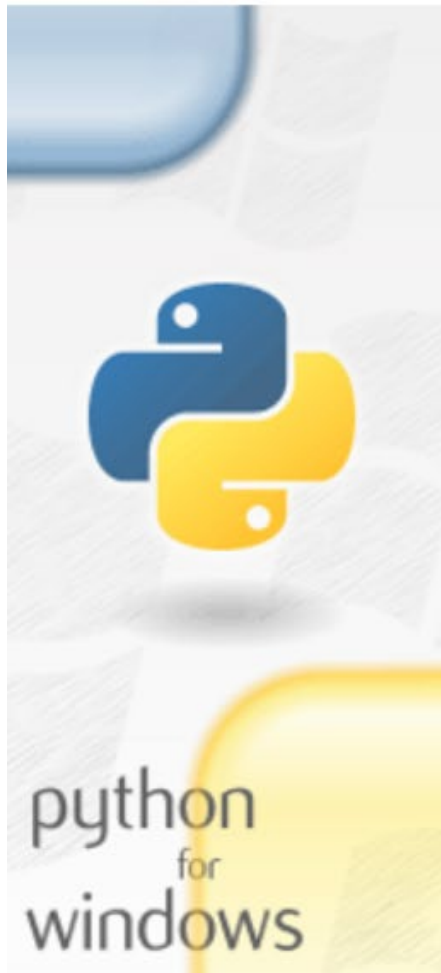
Python 3.8.5

Note that Python 3.5+ cannot be used on Windows XP or earlier.

Not the OS you are looking for? Python can be used on many operating systems and environments.

View the full list of downloads.





Install Python 3.8.5 (32-bit)

Select Install Now to install Python with default settings, or choose Customize to enable or disable features.



Install Now

C:\Users\amina\AppData\Local\Programs\Python\Python38-32

Includes IDLE, pip and documentation
Creates shortcuts and file associations



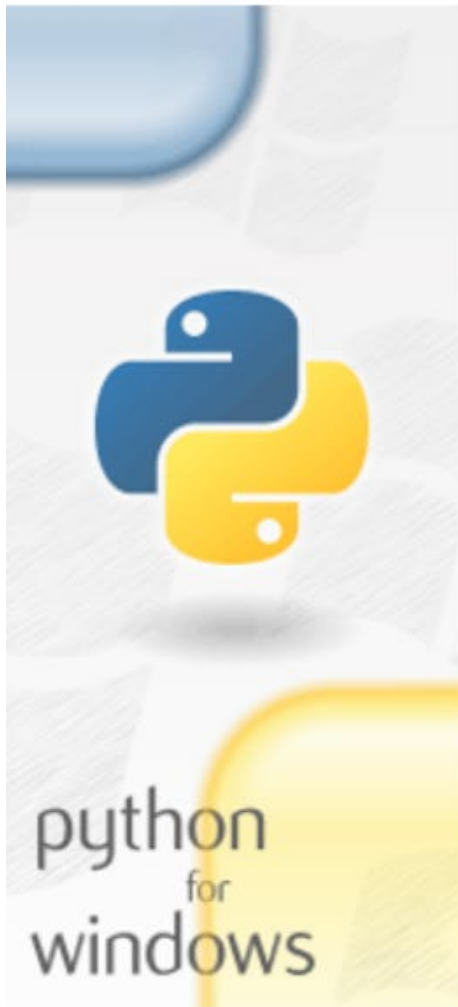
Customize installation

Choose location and features

☒ Install launcher for all users (recommended)

☒ Add Python 3.8 to PATH

Cancel



Setup was successful

Special thanks to Mark Hammond, without whose years of freely shared Windows expertise, Python for Windows would still be Python for DOS.

New to Python? Start with the [online tutorial](#) and [documentation](#).

See [what's new](#) in this release.

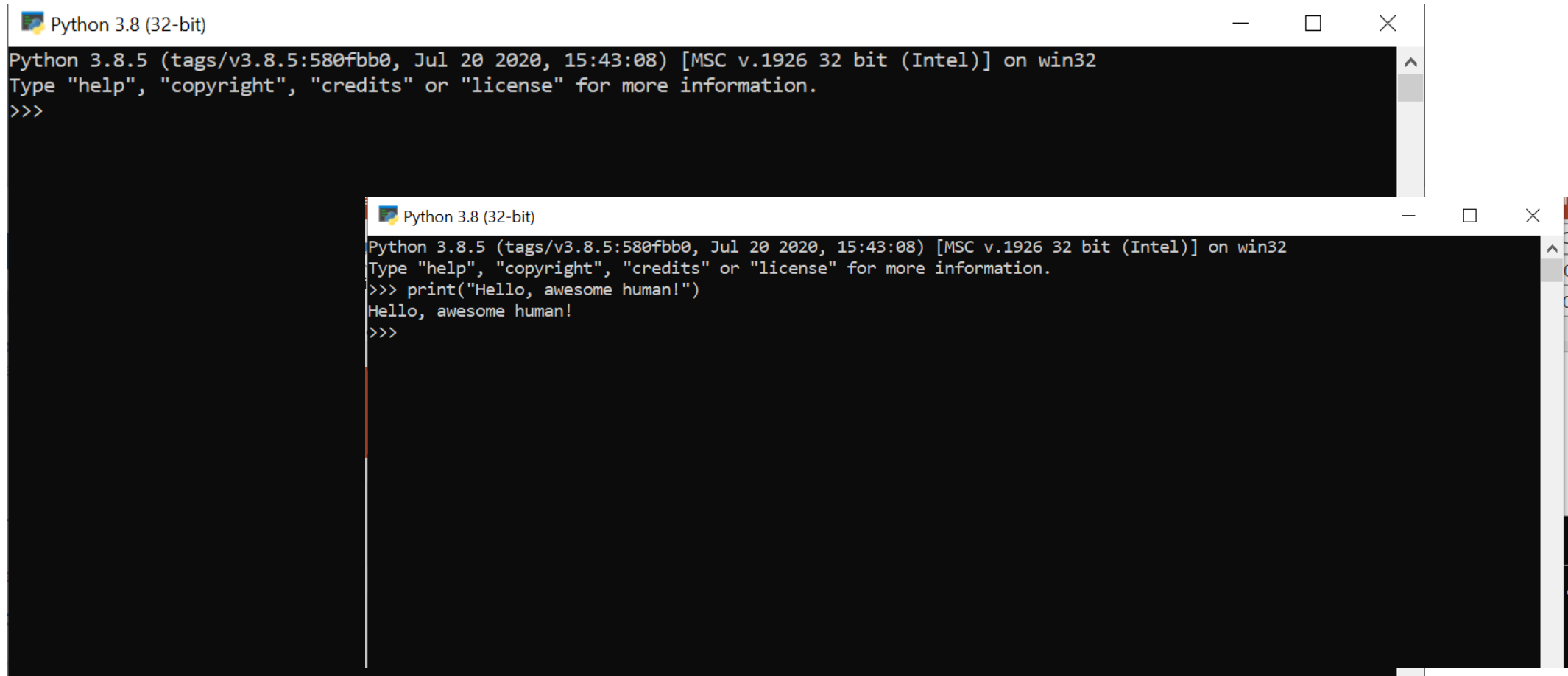


Disable path length limit

Changes your machine configuration to allow programs, including Python, to bypass the 260 character "MAX_PATH" limitation.

Close

Python Command Shell



```
Python 3.8 (32-bit)
Python 3.8.5 (tags/v3.8.5:580fbb0, Jul 20 2020, 15:43:08) [MSC v.1926 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>

Python 3.8 (32-bit)
Python 3.8.5 (tags/v3.8.5:580fbb0, Jul 20 2020, 15:43:08) [MSC v.1926 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello, awesome human!")
Hello, awesome human!
>>>
```

Python Command Shell vs Editor

- Python code can be written in the shell. The shell is great for short tasks and programs.
- A code editor or integrated development environment (IDE) helps organize larger programs.
 1. Edit and Save Source Code
 2. Highlight Errors in Syntax and Formatting
 3. Debug Code



Editors or IDEs

- Many code editors exist. If you are already familiar and happy using one, feel free to use it.
 - Examples: Pydev plugin for Eclipse, GNU/Emacs, Visual Studio Code, Spyder, Jupyter Notebooks

Free Python IDE	Python IDE for Mac	Python IDE for Windows
<ul style="list-style-type: none">• PyDev• Visual Studio Code• Spyder• Thonny	<ul style="list-style-type: none">• PyDev• Pycharm• Visual Studio Code• Spyder• Thonny	<ul style="list-style-type: none">• PyDev• Pycharm• Visual Studio Code• Spyder• Thonny

Editor/IDE PyCharm: <https://www.jetbrains.com/pycharm/>

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PC **PyCharm**

The Python IDE
for Professional Developers

DOWNLOAD

Online Real-Time Coding Tutorials

- There are many options for learning Python through online, interactive tutorials. There are also games, videos and block coding.
- We're going to reference several online tutorials throughout this course. When anything is required reading, a URL / website will be provided. To get started please bookmark:

1. **W3School Python Course**

https://www.w3schools.com/python/python_getstarted.asp

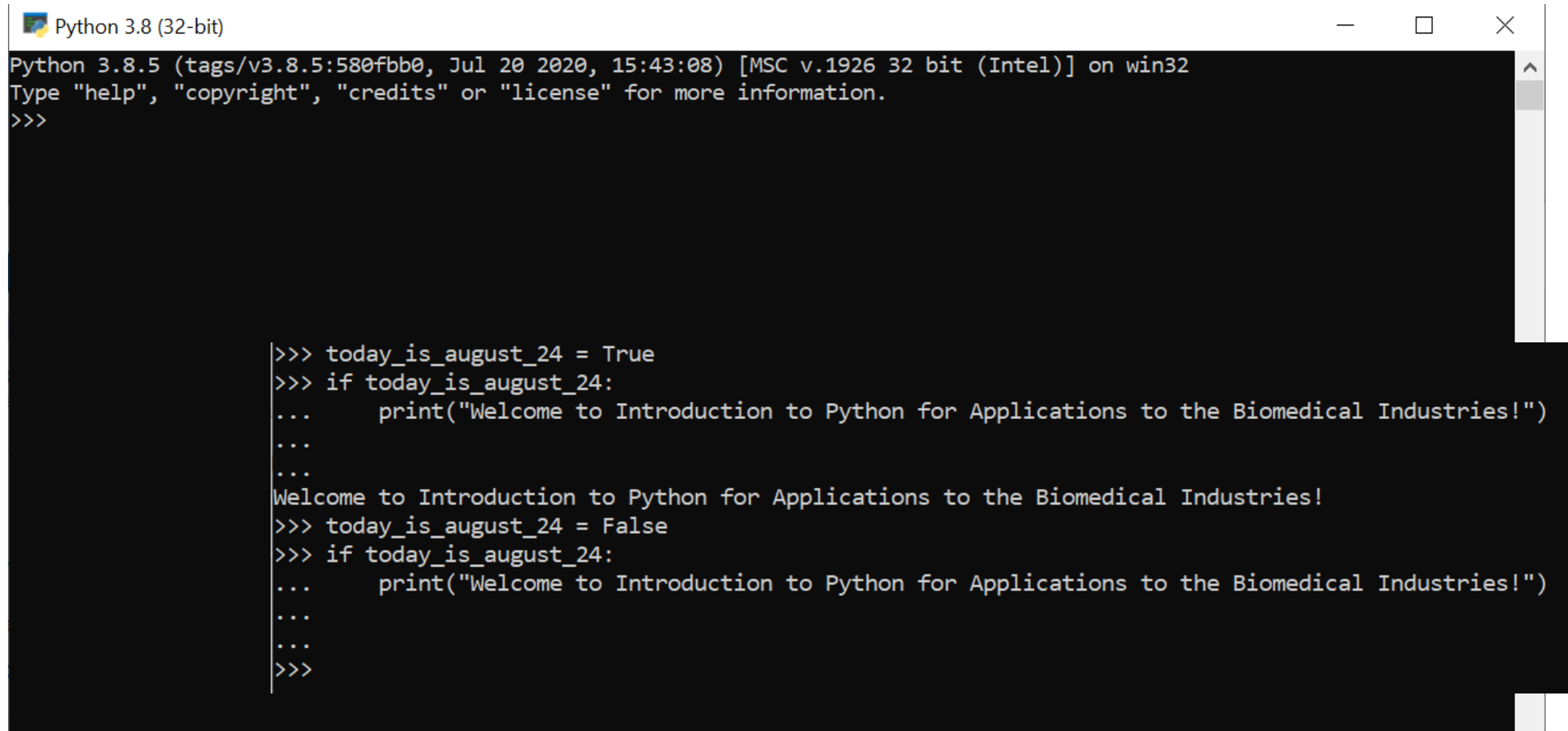
2. **Main online “textbook” is an interactive zyBook (\$77):**

- Intro Video: <https://vimeo.com/285133146/48bc90afb5>
- zyBook Programming in Python 3 with zyLabs
- Sign in or create an account at learn.zybooks.com
- Enter zyBook code: [UTSABME6303Fall2020](#)

Our First Python Code – Performed 3 ways

Way 1:

In the
Python Shell

A screenshot of a Python 3.8 (32-bit) shell window. The window title is "Python 3.8 (32-bit)". The prompt is "Python 3.8.5 (tags/v3.8.5:580fbb0, Jul 20 2020, 15:43:08) [MSC v.1926 32 bit (Intel)] on win32". The prompt also says "Type 'help', 'copyright', 'credits' or 'license' for more information." and shows the prompt ">>>". The code being executed is:

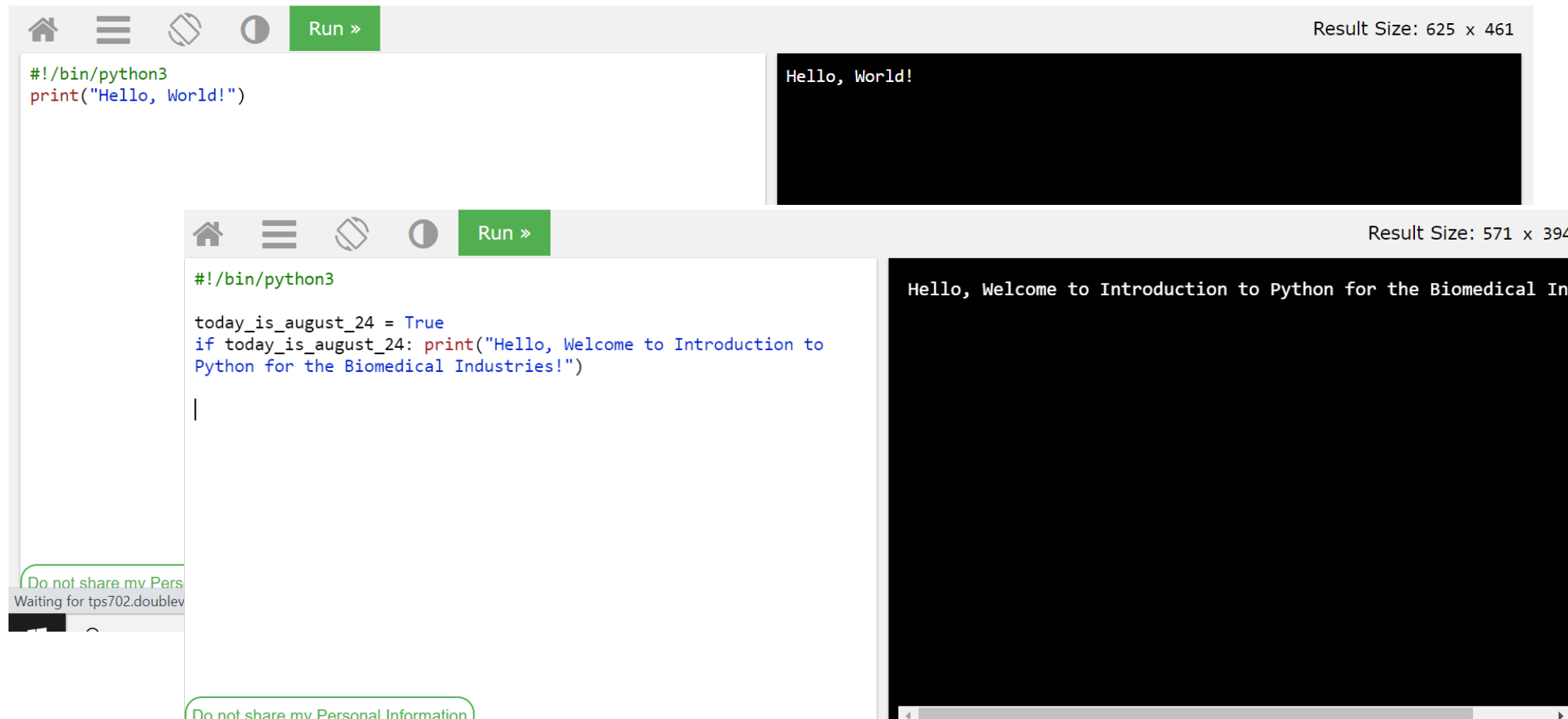
```
>>> today_is_august_24 = True
>>> if today_is_august_24:
...     print("Welcome to Introduction to Python for Applications to the Biomedical Industries!")
...
...
Welcome to Introduction to Python for Applications to the Biomedical Industries!
>>> today_is_august_24 = False
>>> if today_is_august_24:
...     print("Welcome to Introduction to Python for Applications to the Biomedical Industries!")
...
...
...
>>>
```

Our First Python Code – Performed 3 ways

Way 2:

Through the web browser on W3School

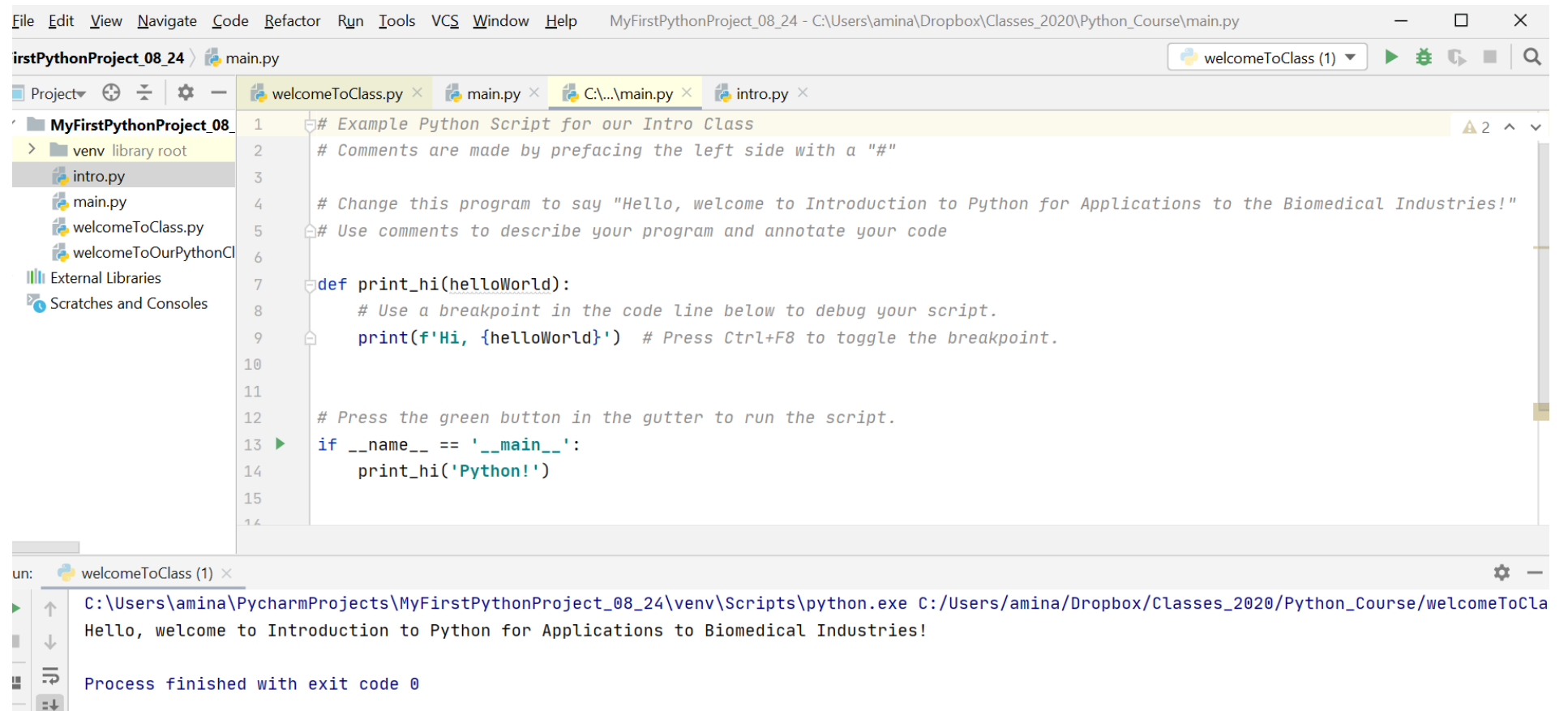
https://www.w3schools.com/python/trypython.asp?filename=demo_helloworld



Our First Python Code – Performed 3 ways

Way 3:

Through the
IDE / editor
PyCharm



The screenshot shows the PyCharm IDE interface. The top toolbar includes menus like File, Edit, View, Navigate, Code, Refactor, Run, Tools, VCS, Window, and Help. The title bar indicates the project name 'MyFirstPythonProject_08_24' and the file path 'C:\Users\amina\Dropbox\Classes_2020\Python_Course\main.py'. The left sidebar shows the project structure with folders 'venv' and 'library root', and files 'intro.py', 'main.py', 'welcomeToClass.py', and 'welcomeToOurPythonCl'. The main editor window displays the code for 'welcomeToClass.py'. The code includes comments and a function 'print_hi' that prints a message. The bottom panel shows the output of the script, which is 'Hello, welcome to Introduction to Python for Applications to the Biomedical Industries!'. The status bar at the bottom indicates 'Process finished with exit code 0'.

```
1 # Example Python Script for our Intro Class
2 # Comments are made by prefacing the left side with a "#"
3
4 # Change this program to say "Hello, welcome to Introduction to Python for Applications to the Biomedical Industries!"
5 # Use comments to describe your program and annotate your code
6
7 def print_hi(helloWorld):
8     # Use a breakpoint in the code line below to debug your script.
9     print(f'Hi, {helloWorld}') # Press Ctrl+F8 to toggle the breakpoint.
10
11
12 # Press the green button in the gutter to run the script.
13 if __name__ == '__main__':
14     print_hi('Python!')
```

un: welcomeToClass (1) ×

C:\Users\amina\PycharmProjects\MyFirstPythonProject_08_24\venv\Scripts\python.exe C:/Users/amina/Dropbox/Classes_2020/Python_Course/welcomeToCla
Hello, welcome to Introduction to Python for Applications to the Biomedical Industries!

Process finished with exit code 0