

Astroscholars

Intro to computing

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Astroscholar: Intro to Computing

- What is a computer program?
- What is Python?
- How to run Python
- Introduction to Python

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But before we get into it...

This is a class to get you into computing.
If it is easy for you, please help your peers.
If it is difficult for you, please ask for help.

The goal is NOT to get you to be a professional developer. The goal is to get you to think “oh, it is not that scary”.

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What is a computer program?

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e.g., your favorite social media app uses an algorithm to decide what posts to show you

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What is Python?

Python is an **interpreted**, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code **readability** with its notable use of significant whitespace.

Python is **dynamically typed** and **garbage-collected** (a form of automatic memory management). It supports multiple programming paradigms, including procedural, object-oriented, and functional programming.

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In simpler words: Python has been created to be intuitive and flexible and it is very widely used, which means that you can find a lot of help just googling your question.

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What is Python?

What does “dynamically typed” mean?

The process of verifying and enforcing the constraints of types is called type checking. Type checking may occur either at compile-time (a static check) (C, C++, Fortran) or at run-time (dynamic check) (Python, Javascript, PHP, Ruby). Dynamically typed languages are generally slower but more flexible.

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What is Python?

Why is Python so popular in astronomy?

- Easy to start using it and do meaningful things
- Good support for numerical and scientific libraries
- Good plotting libraries - publication quality plots
- Large and very responsive community which supports the language and associated tools
- Open source

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How to run Python

Most operating systems already provide a python interpreter. If you need to install it yourself, **conda** is a good package manager. Basically, it lets you install software and keep it into containers so you can install multiple versions without them bothering each other.

Packages can then be installed via conda itself or using **PyPi** which is another way to upload and store packages when ready to be installed.

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How to run Python

How to run Python:

- With Jupyter Notebooks
- The default python shell
- The interactive python shell (ipython)
- Running scripts (do_what_i_need.py)

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To keep things simple and not have to worry about installations, we will use Google Collab which provides Jupyter Notebooks with Python and other packages already installed and ready to be used through the browser.

Astroscholar: Intro to Computing Questions?

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Introduction to Python

The screenshot shows the GitHub repository page for 'astroscholars/tutorial/Day1.ipynb'. The repository is owned by 'nden' and has a single commit 'update Day1' from '10e1561' made 'last year'. The file is 579 lines (579 loc) and 16.6 KB. The 'Preview' tab is selected, showing an 'Outline' section with a bulleted list of topics: 'What is a computer program?', 'What is Python?', 'Introduction to Python types', and 'How to run Python' (which includes sub-points for 'Jupyter notebooks', 'Interactively - ipython', and 'On the command line - scripts'). Below the outline, the text 'What is a computer program?' is followed by a quote from Wikipedia: 'A **computer program** is a collection of instructions that performs a specific task when executed by a computer. Most computer devices require programs to function properly. A computer program is usually written by a computer programmer in a programming language. From the program in its human-readable form of source code, a **compiler** or assembler can derive machine code—a form consisting of instructions that the computer can directly execute. Alternatively, a computer program may be executed with the aid of an **interpreter**. A collection of computer programs, libraries, and related data are referred to as **software**. Computer programs may be categorized along functional lines, such as application software and system software. The underlying method used for some calculation or manipulation is known as an'.

The screenshot shows the Google Colab interface for 'Untitled1.ipynb'. The interface includes a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help'. A toolbar at the top right shows 'Connect', 'Gemini', and a share icon. The main area contains a single code cell with the text 'Start coding or generate with AI.' and a play button icon. The left sidebar shows a file explorer with a folder icon and a search icon.