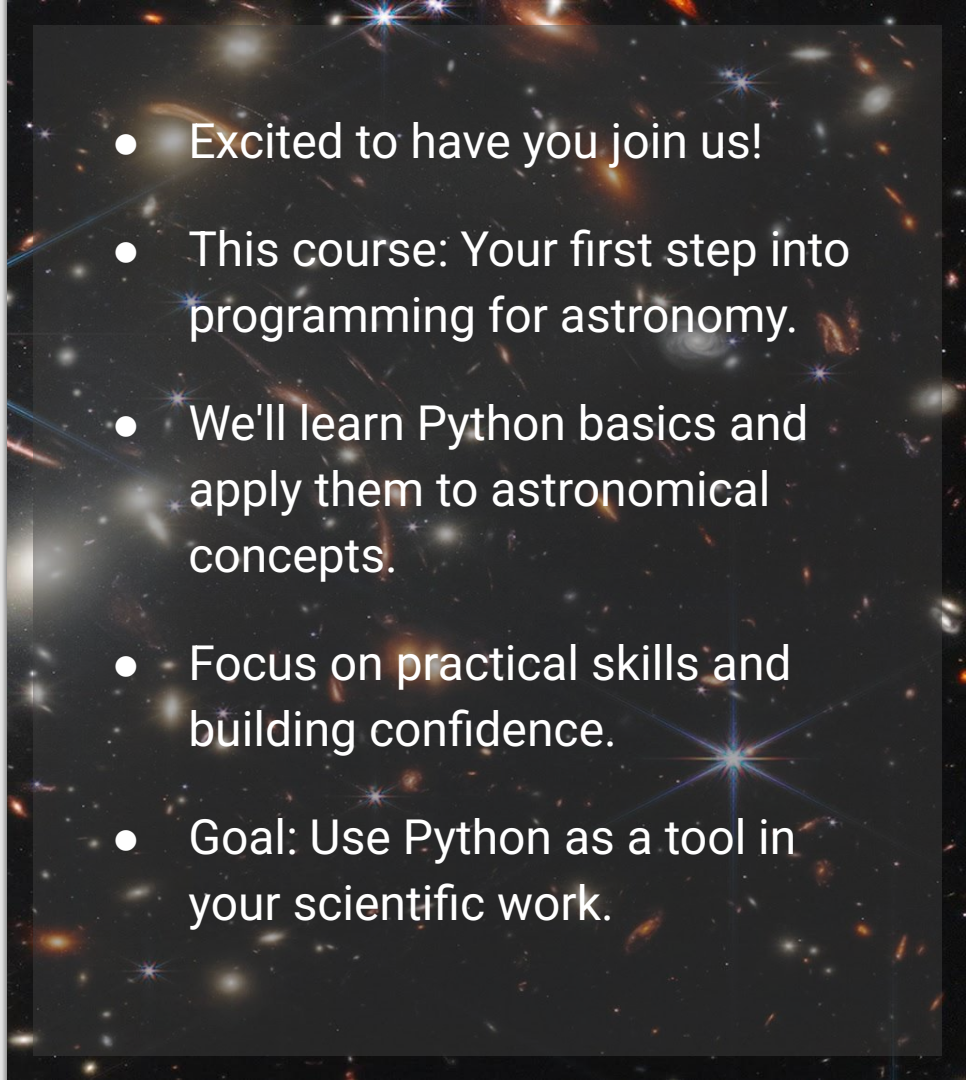
BRICS/IDIA: Data Analytics Training

Pre-course Orientation

May 7, 2025

Daniel Egbo

Welcome Aboard



- Excited to have you join us!
- This course: Your first step into programming for astronomy.
- We'll learn Python basics and apply them to astronomical concepts.
- Focus on practical skills and building confidence.
- Goal: Use Python as a tool in your scientific work.

About BRICS Astronomy

Name, Summit Details and Chairmanship

- BRICS originally stands for Brazil, Russia, India, China and South Africa.
- Astronomy officially became a BRICS thematic science area in 2014, leading to the formation of the BRICS Astronomy Working Group (BAWG) in 2015.
- the BRICS Intelligent Telescope and Data Network, focusing on transients, survey science, time domain astronomy, and Big Data.

About IDIA

IDIA Inter-University Institute for Data Intensive Astronomy

University of Cape Town · iYunivesithi yaseKapa · Universiteit van Kaapstad

UNIVERSITY of the WESTERN CAPE

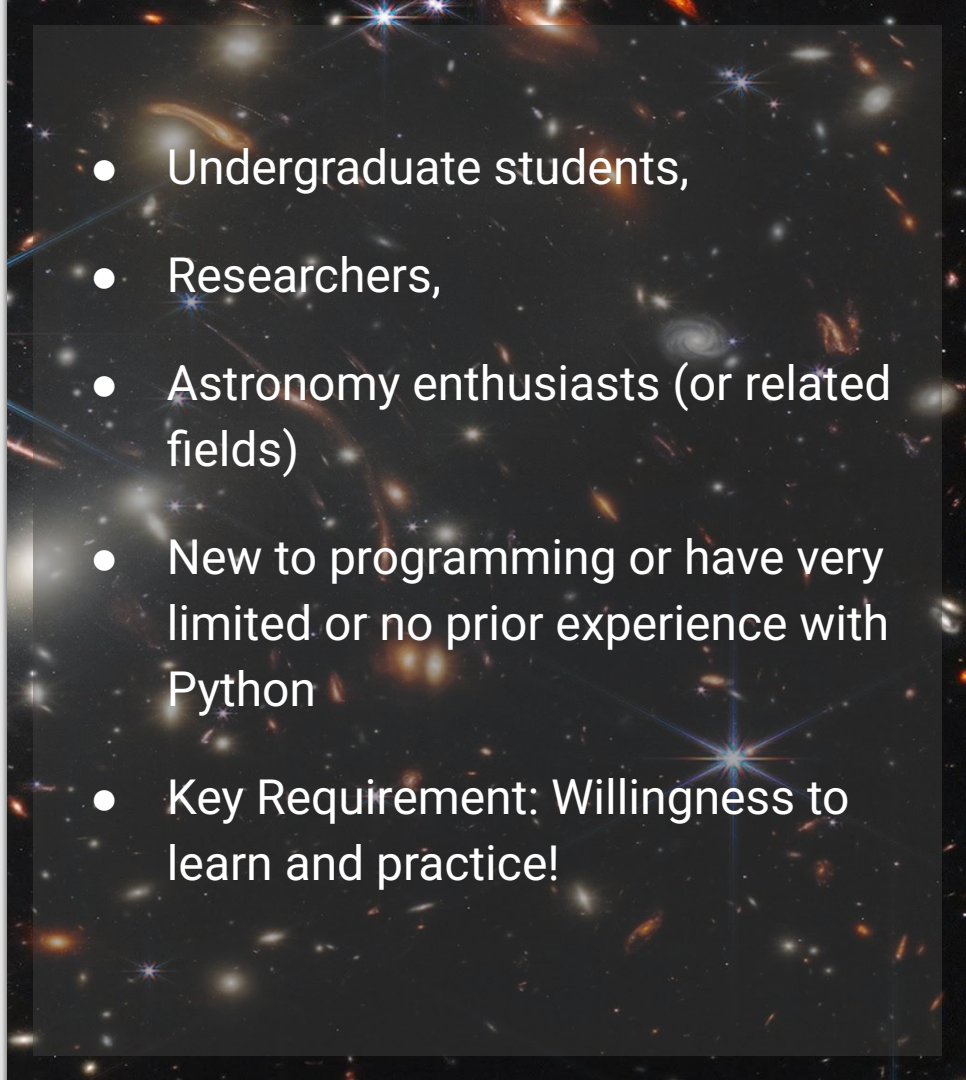
UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- Primary goal: to build the capacity and expertise needed for data intensive research on large survey science projects (and in particular MeerKAT and other large projects on SKA pathfinder telescopes)
- IDIA has set up the data-intensive research cloud facility *ilifu* to service its scientific community, as well as visualistion software CARTA and iDaVIE
- This course follows IDIA's vision to **inspire**, **train**, and then **empower** the next generation of data scientists

Why Python for Astronomy?

- ❑ The common programming tool for modern astronomy.
- ❑ Automate repetitive tasks (calculations, data processing).
- ❑ Analyze large datasets efficiently.
- ❑ Create plots and visualizations.
- ❑ Widely used in research – access powerful libraries!
- ❑ It is a valuable skill for your future studies and career.

Audience



- Undergraduate students,
- Researchers,
- Astronomy enthusiasts (or related fields)
- New to programming or have very limited or no prior experience with Python
- Key Requirement: Willingness to learn and practice!

Objectives

- ❑ Understand fundamental programming concepts (variables, data types, operators).
- ❑ Write and execute basic Python scripts.
- ❑ Define and use functions to create reusable and modular code.
- ❑ Read data and perform data statistical analysis.
- ❑ Perform data visualisations relevant in astronomy.
- ❑ Understand the concept of packages and install external packages (like **pandas**, **astropy** etc.) using **pip** or **conda**.
- ❑ Apply these Python concepts to solve simple problems relevant to astronomy.

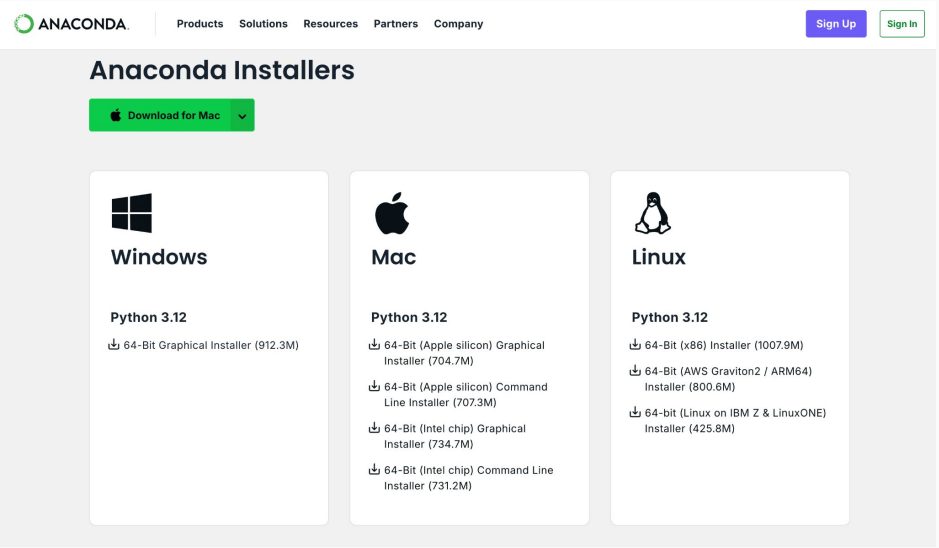
Course Roadmap/Schedule

- ❑ Orientation week (7 May 2025)
- ❑ Introduction to Python (14 May 2025)
- ❑ Introduction to Data Analysis (21 May 2025)
- ❑ Data Visualization/representation and Colour theory (28 May 2025)
- ❑ Astronomical Data Sources & Data Handling (4 June 2025)
- ❑ Astronomy Time Series Analysis (11 June 2025)
- ❑ Machine Learning Basics for Astronomy (18 June 2025)
- ❑ Machine Learning Basics for Astronomy (25 June 2025)
- ❑ Week 8: Capstone Project & Presentation (2 July 2025)

Pre-requisites

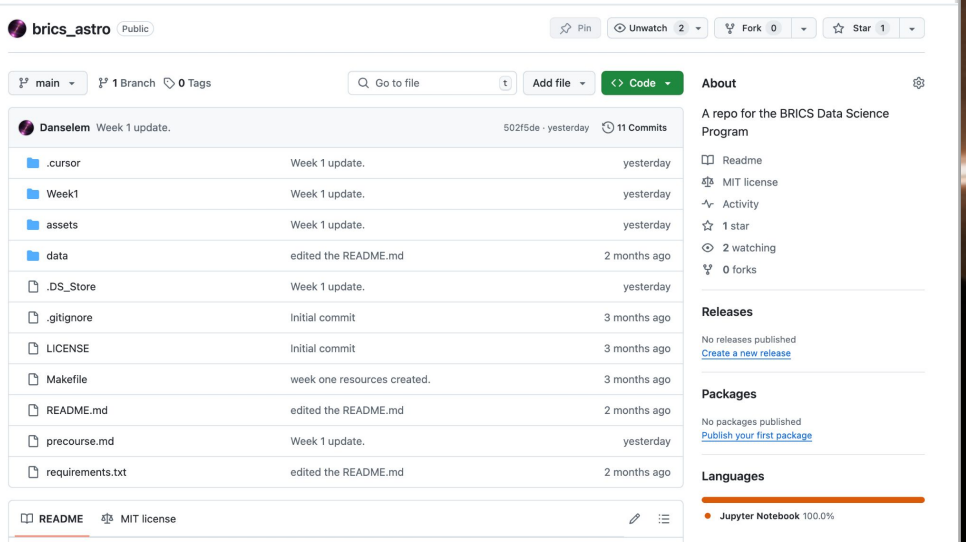
- Access to computer
- Platform can be any of the following (Windows, macOS, or Linux)
- Access to internet
- **Anaconda** software installation
- Fore more details visit: pre-course link.
- Join the Slack workspace.

Installation



- Download Anaconda from the link.
- Ensure you select the installer for your platform (Windows, macOS, or Linux).
- See installation guidelines here
- Fore more details visit: pre-course link.
- If you encounter any problem, kindly share your issues in precourse-orientation Slack channel.

Learning Resources



All learning resources are available or accessible at the training project [Github repo](#).

The repo contains the following:

- Pre course information and guidelines.
- Notebooks per course week.
- The resources will also be shared in the Slack group.

For more info about using Git and Github, visit the [freecodecamp tutorial](#).

Code of conduct

- Treat all participants with respect and kindness.
- No harassment, bullying, or discrimination of any kind.
- Respect and properly cite the work of others. Welcome newcomers and diverse perspectives.
- Answer questions and discuss respectfully.
- Address or report Code of Conduct violations.
- Applies to all course activities, online and offline.
- Issues? Contact course organizers confidentially.

How to succeed in this training

- Engage Actively with Content: Ask questions during sessions and in the Slack community to deepen your understanding.
- Practice Consistently: Apply what you learn through hands-on exercises available in jupyter Notebook.
- Leverage All Course Resources: Use videos, readings, shared tools, and Slack effectively.
- Build a Portfolio: Turn your projects and visualizations into a portfolio to demonstrate your Data Analysis skills.

Links

- ❑ Pre-course link: Precourse
- ❑ Join the Slack group: Slack
- ❑ Anaconda Software: Software access
- ❑ Anaconda Installation: Installation guideline
- ❑ Git and Github tutorial (optional): Freecodecamp
- ❑ Course Github repo: Github repo
- ❑ How to run Jupyter Notebooks: Jupyter


Q&A
SARAO, Heywood et al. (2022) / J. C. Muñoz-Mateos
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