SAINTS@tlabs Short Course

Computational Physics with Python
Date: 24-26 June 2019 09h00 – 16h00

Venue: Computer Laboratory, J-block, NRF iThemba LABS (Cape Town)

Lecturers/facilitators: Prof Brandon van der Ventel (Physics Department, Stellenbosch University)

Target group: students/staff/interns at iThemba LABS involved with Physics research and doing computer programming

Level: Beginner

Prerequisites: No prior knowledge of Python is required.

Materials: All materials will be provided.

Cost: Free for participants but only twenty places available on first-come first served basis.

Certificate of attendance: will only be issued to participants who attend **the entire** course.

Note: students must get their research supervisors permission to attend and staff must get their manager's permission to attend.

Link for registering: https://indico.tlabs.ac.za/event/90/registrations/56/

Course Outline:

1. Introduction to coding

   A general overview of programming languages. Comparison between different languages. Why proficiency in Python is an essential skill for the 21st century.

2. Setting up Integrated Development Environment (IDE)

   The Anaconda Distribution will be introduced since it is the current state-of-the-art data science platform. All Python coding will be done within the Jupyter notebook environment.

3. Crash course in Python

   Summary and hands-on examples of the most important Python commands.

4. Introduction to numpy: the fundamental package for scientific computing in Python.
5. Introduction to dataframes with Python using pandas
6. Introduction to plotting in Python with matplotlib
7. Introduction to seaborn: powerful and flexible plotting package built on matplotlib and easily integrated with pandas dataframes
8. Solving differential equations with Python
   (a) Classical physics: analyse single and coupled differentials equations
   (b) Non-physics problems: solution and formulation of mathematical biology problems: epidemiology
   (c) Quantum mechanics: solution of the one-dimensional Schrödinger equation for a variety of potentials
9. Exercises on each section

For further information contact:

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