



PROVIDER N.2224

Python for Scientific Programming

February 6 - April 3, 2026

organised by

ISTITUTO SUPERIORE DI SANITÀ
Centro Protezione dalle Radiazioni e fisica computazionale (PRORA)

N° ID: 081C26_P

Rationale

Python is one of the most important programming languages to learn because it combines simplicity with versatility. Its clear and readable syntax makes it accessible to beginners, while its powerful features and vast ecosystem of libraries support advanced applications in fields such as data science, artificial intelligence, web development, and scientific computing. Today, Python is also widely used as a “glue language” to make different frameworks and tools interact seamlessly, enabling researchers and developers to integrate diverse systems into coherent workflows. Its strong community support, broad adoption in academia and industry, and continuing relevance in emerging technologies ensure that learning Python is an investment that remains useful over time.

In particular, Python has become essential in the biomedical domain: many state-of-the-art research tools and frameworks are built on it. For example, Biopython for computational biology, NiBabel and Nilearn for neuroimaging, scikit-image and SimpleITK for medical image processing, and PyTorch or TensorFlow for deep learning in biomedical imaging and diagnostics. Large collaborative initiatives such as MONAI (Medical Open Network for AI) also rely heavily on Python to provide reproducible, open, and efficient workflows in medical AI research.

Aim and objectives

Python is today a central tool for scientists across many disciplines. This course will provide the foundation needed to read, write, and modify code independently.

This course is a foundational one, but it is designed to build proficiency in reading, modifying, and using code effectively at a high level. The initial syntax exercises aim to teach the core properties of Python, while classes and objects are introduced to enable the correct and efficient use of scientific libraries. Attention is also given to data types and conversions, which are essential for orchestrating multiple packages and integrating diverse computational tools within a single workflow.

This course introduces Python programming with a focus on applications in scientific computing. No prior programming knowledge is assumed. By the end, students will be able to write Python scripts, manipulate data, visualize results, and apply Python libraries to solve basic scientific problems.



PROVIDER N.2224

Specific objectives

At the end of the course the participants will be able to:

- Acquire new skills to be used in their research or professional work
- Gain a solid introduction to Python programming
- Write, run, and debug simple Python programs
- Be more independent in developing and modifying code for scientific tasks
- Read and adapt code provided by assistants such as LLMs

Didactic method

Frontal teaching and Hands on exercises in small groups.

PROGRAMME

Friday 6 February (aula Nitti-Bovet)

- 14.30 Introduction to the course
- 15.00 *Introduction to programming languages and computer architecture*
A. Ciardiello
- 16.00 *Python as a scientific tool*
A. Ciardiello
- 16.30 Closing of the day

Tuesday 10 February (aula Marotta)

- 14.30 *Programming language syntax*
A. Del Bove
- 15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci
- 17.00 Closing of the day

Friday 13 February (aula Marotta)

- 14.30 *Programming language syntax*
A. Del Bove
- 15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci
- 17.00 Closing of the day



PROVIDER N.2224

Tuesday 17 February (aula Marotta)

- 14.30 *Programming language syntax*
A. Ciardiello
- 15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci
- 17.00 Closing of the day

Friday 20 February (aula Marotta)

- 14.30 *Numerical Computing with NumPy*
C. Mancini Terracciano
- 15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci
- 17.00 Closing of the day

Tuesday 24 February (aula Marotta)

- 14.30 *Numerical Computing with NumPy*
C. Mancini Terracciano
- 15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci
- 17.00 Closing of the day

Tuesday 3 March (aula Nitti-Bovet)

- 14.30 *Data Analysis with Pandas and Data Visualization with Matplotlib*
A. Cacioppo
- 15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci
- 17.00 Closing of the day

Friday 6 March (aula Marotta)

- 14.30 *Data Analysis with Pandas and Data Visualization with Matplotlib*
A. Cacioppo



PROVIDER N.2224

15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci

17.00 Closing of the day

Tuesday 10 March (aula Nitti-Bovet)

14.30 *Advanced Topics and Tools*
G. Vinci

15.30 Hands On Exercises in small groups
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci

17.00 Closing of the day

Friday 13 March (aula Marotta)

14.30 *Final Project and Review*
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci

17.00 Closing of the day

Tuesday 17 March (aula Nitti-Bovet)

14.30 *Final Project and Review*
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci

17.00 Closing of the day

Friday 3 April (aula Marotta)

14.30 Final Exam
A. Ciardiello, A. Del Bove, A. Cacioppo, G. Vinci

17.30 Closing of the course

TRAINERS and TUTORS

Andrea Cacioppo - Dipartimento di Fisica, Sapienza Università di Roma

Andrea Ciardiello - Centro PRORA, Istituto Superiore di Sanità, Roma

Alice Del Bove - Servizio Informatico, Istituto Superiore di Sanità, Roma

Carlo Mancini Terracciano - Dipartimento di Fisica, Sapienza Università di Roma

Gianni Valerio Vinci - Centro PRORA, Istituto Superiore di Sanità, Roma



PROVIDER N.2224

Scientific Director

ANDREA CIARDIELLO
Centro Protezione dalle Radiazioni e fisica computazionale
Istituto Superiore di Sanità
E-mail: andrea.ciardiello@iss.it

Scientific Secretariat

GIANNI VALERIO VINCI
Centro Protezione dalle Radiazioni e fisica computazionale
Istituto Superiore di Sanità
E-mail: AI4health@iss.it

Organizational Secretariat

ALICE DEL BOVE
Servizio Informatico
Istituto Superiore di Sanità, Rome
E-mail: alice.delbove@iss.it

GENERAL INFORMATION

Venue

Istituto Superiore di Sanità
Via del Castro Laurenziano, 10 - Rome

aula Nitti-Bovet: 6 February; 3, 10, 17 March 2026

aula Marotta: 10, 13, 17, 20, 24 February; 6, 13 March; 3 April 2026

Target audience and maximum number of participants

The course is open to anyone who works with data and is interested in learning the fundamentals of scientific programming.

A basic knowledge of data analysis is recommended as a prerequisite.

The course will be delivered in English.

A maximum of 35 participants will be admitted.

Registration and participation procedures

To register, please complete and submit by 31 January 2026 the application form available at the following link:

[APPLICATION FORM](#).

Actual attendance at the event will be recorded by signing in and out on the dedicated attendance register.

Participation is free of charge.

Travel and accommodation expenses are the responsibility of the participant.

Participant selection criteria

Applications will be accepted on a first-come, first-served basis.

If the number of applications exceeds the maximum capacity, priority will be given to early-career researchers, PhD students, and trainee.

Selected participants will be notified by e-mail.



PROVIDER N.2224

Learning assessment

Learning outcomes will be assessed through a practical simulation on the last day of the course. Participants will be asked to write a simple program, modify code provided by the instructors, and debug common syntax errors. This final test is compulsory for all participants to obtain the certificate of attendance. In addition, an event satisfaction questionnaire will be administered.

Certificates

At the end of the event, participants who request it will receive a certificate of attendance. The certificate of participation, including the total training hours, will be sent to participants who have attended at least 80% of the course and achieved a minimum score of 75% in the learning assessment.

For any further information, please contact the Scientific Secretariat using the contact details provided above.