Course number	U-LAS70 10001 SJ50				
Course title (and course title in English)	ILASセミナー：パイソンによる科学現象の可視化 ILAS Seminar :Visualising Science with Python	Instructor's name, job title, and department of affiliation	Institute for Advanced Study Program-Specific Assistant Professor,MATTONI, Giordano		
Group	Seminars in Liberal Arts and Sciences	Number of credits	2	Number of weekly time blocks	1
Class style	seminar (Face-to-face course)	Year/semesters	2025・First semester	Quota (Freshman)	15 (15)
Target year	Mainly 1st year students	Eligible students	For all majors	Days and periods	Tue.5
Classroom	01, Yoshida-South Campus Bldg. No. 1			Language of instruction	English
Keyword	science / Python / data / analysis / program				

[Overview and purpose of the course]

This is a practical course with the aim of learning how to make scientific data visible to the human eye. Scientific information often takes the form of written numbers or text that do not have a clear meaning for humans. With a series of hands-on lessons, students will learn how to use Python, a powerful tool and programming language, to make science visible, analyse it, and interpret it. Lessons will be highly interactive, with students required to write their own examples and immediately test what taught in the class. Students will be encouraged to get independent at finding their own resources on the Internet and develop critical scientific thinking.

[Course objectives]

- Display scientific data in an effective manner (graphs, labels, pointers)
- Learn the basics of Python programming language
- Interpret data based on mathematical models, critical thinking
- Set up a simple scientific experiment with common tools
- Find own resources by Internet search

[Course schedule and contents)]

このセミナーは、主に英語で行われるが、E2科目として認められないことに注意すること。

Module I: The basics of data plotting
1. Introduction to the course and Python language, installation on own computers
2. Spyder editor, structure of variables, operators, print function
3. Inputs and functions, IF/FOR loops
4. Loading data, function plotting with matplotlib
5. Multiple curves/plots/labels/zooming

Assignment I: Plot given data highlighting its interpretation (20pts + 5/3/1pts for top three students)

Module II: Data analysis
6. Interactive plots and manual fits
7. Data fitting with numpy/complex functions

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8. Interpolation and data matching from different sets
9. Data filtering, background subtraction
10. Data digitiser: test model from a published scientific article

Assignment II: Re-plot data from given scientific article and test models (20pts + 5/3/1pts for top three students)

Module III: Applied science and daily life
11. Parse and plot data from a website
12. Set-up a simple scientific experiment such as pendulum swing, resistivity of a superconductor, light intensity (to be decided according to group size and student interest)
13. Perform measurements with common instruments (i.e., smartphone, voltmeter)
14. Acquire scientific data

15. Final exam: Analysis of data, fitting with a model, interpretation of results (60pts)
16. Feedback class

[Course requirements]

Students are required to bring their own laptops to the lessons and exam. If you do not have a laptop and would like to borrow one for the lessons, please contact the teacher directly.
Active participation is encouraged to develop problem-solving skills and independence.
Basic knowledge of programming can be helpful, but not required.

[Evaluation methods and policy]

Students will be evaluated based on the assignment I and II (20pts each) and a final in-class examination (60pts). At least 60pts are required to pass this course.

[Textbooks]

No textbooks. In addition to the material provided in the class, students are encouraged to find their own resources by Internet search.

[References, etc.]

（References, etc.）
Introduced during class

[Study outside of class (preparation and review)]

One of the objectives of this course is for students to learn to search their own material online (guidelines will be provided in the class).

[Other information (office hours, etc.)]

Flexible office hours (schedule to be discussed in the class).

[Essential courses]