Astroinformatics

— About this course —

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Institute of Astronomy, National Central University

11 September 2023

Outline

1. Overview of the course
2. How to execute Python scripts?
3. Recommended books
4. Are you new to Python programming?
5. Extra activity outside the classroom
6. Classes on 18/Sep and 25/Sep
7. Google Calendar

Astroinformatics

- About this course
  - Semester: first semester of academic year 2023
    - from Sep/2023 to Jan/2024
  - Time: from 09:00 to 11:50 on Monday
  - Classroom: S4-914
  - Instructor: Kinoshita Daisuke
  - Main focus of this course
    - Python programming
    - astronomy
  - Hands-on sessions
    - reading source code of sample Python scripts,
    - executing sample Python scripts and seeing what happens
    - writing your own Python scripts and executing those scripts

Astroinformatics

- Language
  - All the courses offered at Institute of Astronomy are given in English.
  - So, this course is also given in English.
  - English is not my native tongue. If you do not understand what I talk, you can interrupt my talk at any time. Tell me about it.
  - If you have any question, you can ask question either in English or Chinese at any time.

Astroinformatics

- Course web page

"Astroinformatics" course web page

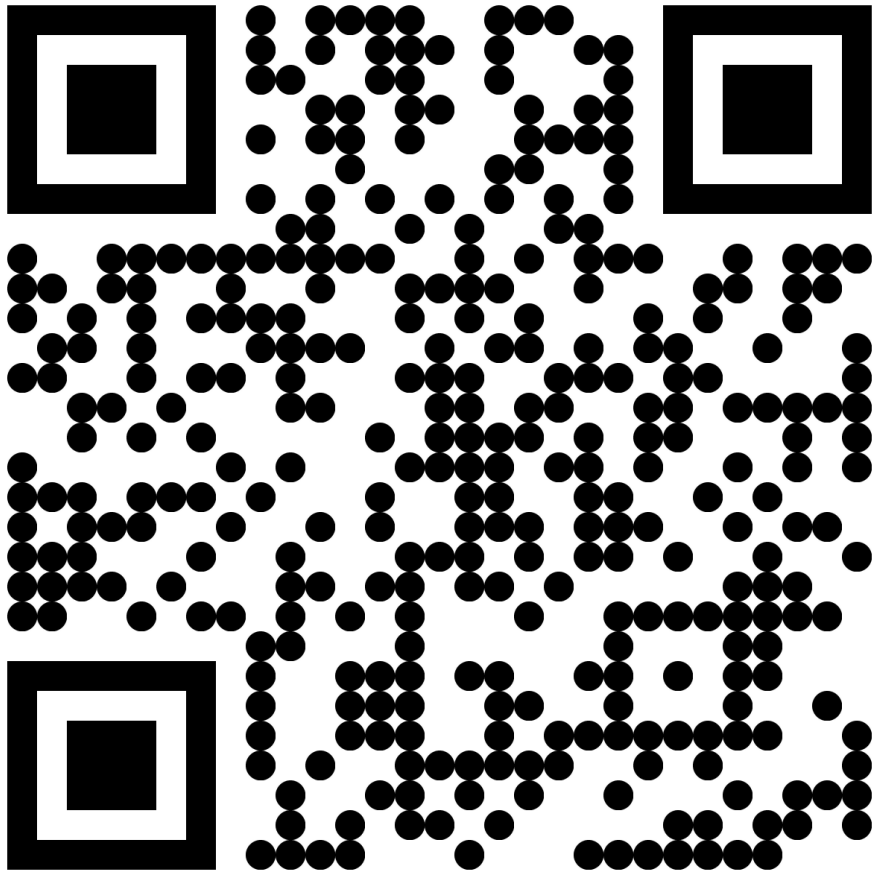
`https://s3b.astro.ncu.edu.tw/ai_202309/`

- GitHub repository

GitHub repository for the course

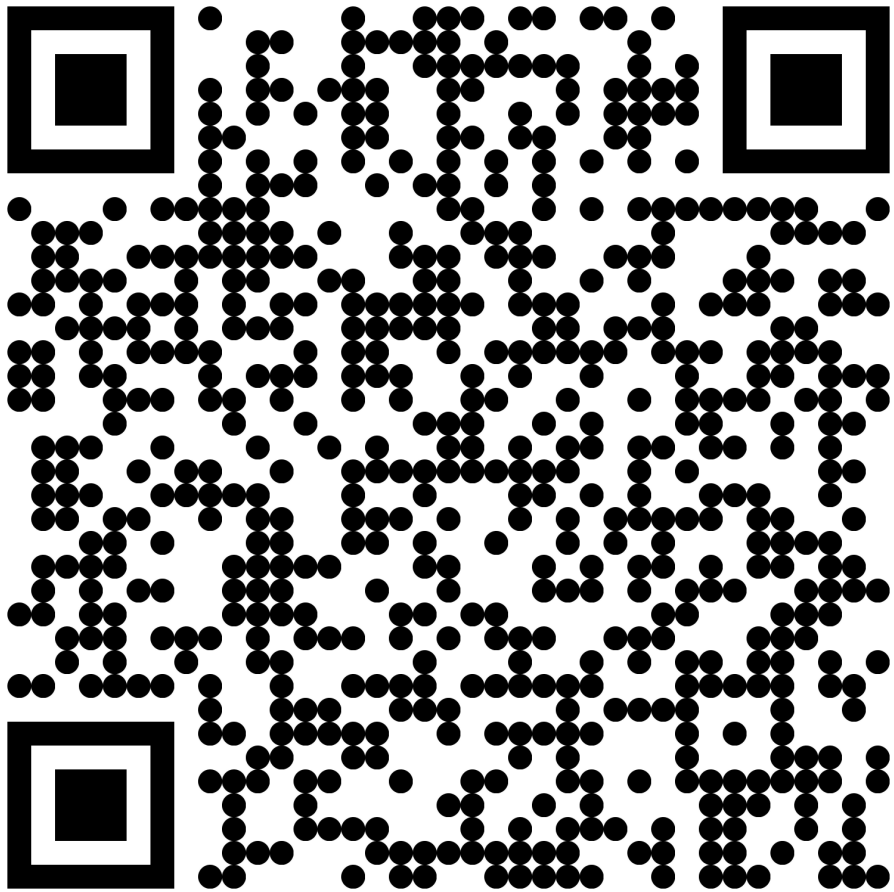
`https://github.com/kinoshitadaisuke/ncu_astroinformatics_202309`

Astroinformatics



https://s3b.astro.ncu.edu.tw/ai_202309/

Astroinformatics



https://github.com/kinoshitadaisuke/ncu_astroinformatics_202309

Grade

- Your grade is evaluated based on
  - attendance (50%)
  - and exercise (50%).
- Attendance: 50%
  - Each week, you submit your response via Google Forms to show your attendance to the class.
  - Each week, you get $50/16 \sim 3.1$ points at maximum.
- Exercise: 50%
  - Each week, you try a set of simple exercises.
    - writing Python scripts and showing source code
    - describing important parts of Python scripts
    - executing Python scripts and showing outputs
  - You need to submit your answer sheet within two weeks via Google Forms.
  - Each week, you get $50/16 \sim 3.1$ points at maximum.

Attendance check

- 50% of your grade is determined by attendance.
- Each week, a form is provided using Google Forms.
- Fill the form in and submit it before leaving the classroom.
- A link to Google Forms can be found at following web page.

"Astroinformatics" course web page

`https://s3b.astro.ncu.edu.tw/ai_202309/`

Exercise submission

- 50% of your grade is determined by exercises.
- Each week, a set of exercises is given.
- Make sure to download the problem-set before leaving the classroom.
- You need to submit your answer sheet within two weeks.
  - e.g. Deadline of the exercise submission for the problem-set given on 11/Sep/2023 is 09:00 on 25/Sep/2023.
- Submit your answer sheet via Google Forms.
  - You can find a link to Google Forms at following web page.

"Astroinformatics" course web page

`https://s3b.astro.ncu.edu.tw/ai_202309/`

Things you bring to the classroom

- Things you need to bring to the classroom
  - computer
    - laptop computer or tablet computer
    - any operating system is fine for this course
    - web browser must be installed on your computer
  - notebook and pens
    - for taking a note
  - mobile phone
    - for taking photos for recording purpose

What do we do in the classroom?

- We write Python scripts and do astronomy.
- What do we do in the classroom?
  - reading sample Python scripts
    - learning important syntax of Python
    - knowing useful modules
    - knowing useful functions
    - knowing useful methods
  - executing sample Python scripts
    - seeing what happens
  - writing your own Python scripts
    - trying number of practices
- Where can we find sample Python scripts for this course?

GitHub repository for the course

`https://github.com/kinoshitadaisuke/ncu_astroinformatics_202309`

What do we do in the classroom?

- First half of the semester
  - Python programming
    - basics of Python
    - Numpy
    - Scipy
    - Matplotlib
- Second half of the semester
  - Astronomy related topics
    - blackbody radiation
    - distribution of asteroids, stars, and galaxies
    - planetary motion and orbital integration
    - HR diagrams of star clusters
    - Hubble diagram

Course material

- Course material is available for your download at following web page.

Course material

`https://s3b.astro.ncu.edu.tw/ai_202309/`

- When you come to the classroom on Monday, turn on your computer, start your favourite web browser, and download course material.
- Course material is provided in PDF format.
  - You need to install software for viewing PDF files.
    - e.g. Xpdf, Okular
  - Xpdf: `https://www.xpdfreader.com/`
  - Okular: `https://okular.kde.org/`

Course material

- Some notes for downloading course material
  - Course material can be downloaded only from computers connected to the network of our university.
    - Connect your computer (laptop computer, tablet computer, mobile phone) to one of Wi-Fi of our university.
    - If you are at the classroom, connect to Wi-Fi "IANCU".
    - If you are outside of our institute, but inside the university, connect to Wi-Fi "NCUWL".
    - If you are at home, use VPN service of our university.
  - Course material is available for your download for a week.
    - For example, files for the class on 11/Sep/2023 are available for your download until 09:00 on 18/Sep/2023.
    - Make sure to download files when you come to the classroom.
    - Make a directory (folder) on your computer exclusively for this course, and place course material in that directory (folder).
  - Course material is locked by a password.
    - The password to unlock PDF files is shown on the screen in the classroom at 09:00 on Monday.

Wi-Fi “NCUWL”

國立中央大學
電子計算機中心

::: | 網站導覽 | 服務時間 | 表單下載 | 常見問題 | 訪客 | 學生 | 教職員 | English |

中心簡介 一般服務 帳號服務 網路服務 E化服務 其它 防疫措施

:::網路服務
Network

- 無線網路
- 學生宿網
- 教職員宿網
- DNS
- VPN
- Cloud Computing
- Netflow 資料
- 10G網路建置
- 雲端運算虛擬主機服務

::: 首頁 / 網路服務 / 無線網路

無線網路

樓內涵蓋範圍

行政大樓各會議室	依仁堂中庭	工一館1F	七餐
舊圖 K 書中心	志希館一樓	土力館1F	九餐
學務處1F	志希館I210會議室	環化館&大講堂	研究生餐廳
游藝館	電算中心大終端機室	工五館A棟1F	管二館餐廳
據德樓	管二館1F&BF	科一~五館1F	松苑餐廳
大講堂&一樓大廳	國鼎館1F	鴻經館&演講廳	女14舍地下室&交誼廳
研一館1F&會議廳	研二館1F&會議廳	電機館	機械館
中大會館	化工系	文一~三館	管理學院
化學系	資工系	網學所	光電大樓
客家學院	圖書館	認知所	

室外涵蓋範圍

太遙中心	環工化工館	大型力學實驗室	籃球場
田徑場	機械館停車場	松苑餐廳	室內
依仁堂公車站牌	光電大樓	客家學院	科二館
科五館	工一館	志希館	大極銅雕

NCUCC 線上客服

https://www.cc.ncu.edu.tw/page/wireless

VPN of our university

https://ncu.edu.tw/VPN/help

How to execute Python scripts?

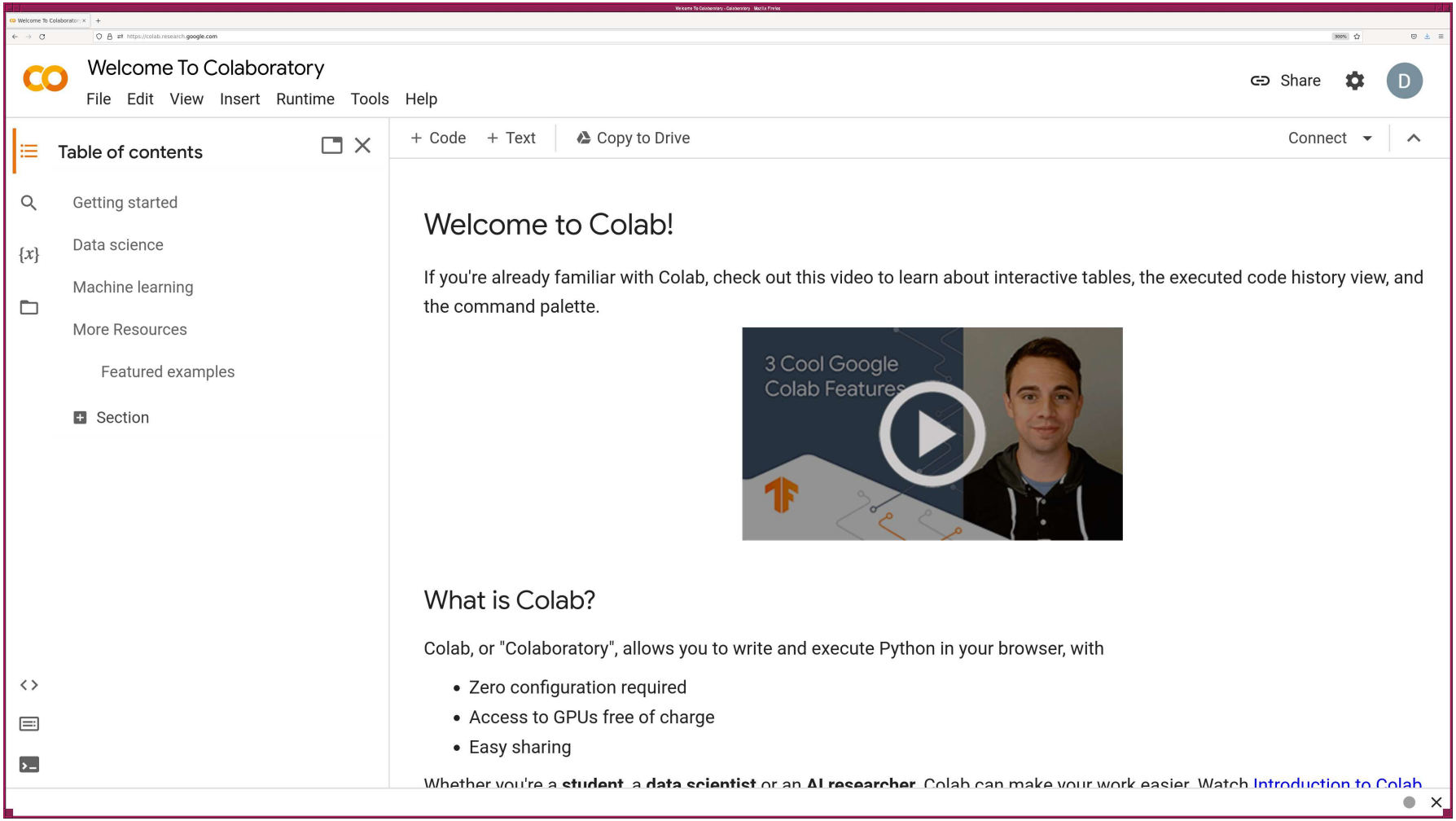
- For this course, we use Google Colaboratory to execute Python scripts.

Google Colaboratory

`https://colab.research.google.com/`

- What you need for using Google Colaboratory?
  - The only thing you need for using Google Colaboratory is a web browser.
  - Install your favourite web browser on your computer.
    - e.g. Firefox, Chrome
- You do not need to install Python on your computer.
  - No Python is needed on your computer.
  - No Numpy is needed on your computer.
  - No Scipy is needed on your computer.
  - No Astropy is needed on your computer.

Google Colaboratory



https://colab.research.google.com/

How to execute Python scripts?

- Method 1 (recommended for this course)
  - Finding a link to a Jupyter Notebook file on Google Drive.
  - Clicking a link and opening a Jupyter Notebook file using Google Colaboratory.
- Method 2
  - Downloading a Jupyter Notebook file from GitHub repository.
  - Opening a Jupyter Notebook file using Google Colaboratory.
- Method 3
  - Downloading a Jupyter Notebook file and a set of Python scripts from GitHub repository.
  - Opening a Jupyter Notebook file using JupyterLab on your computer.
- Method 4
  - Downloading a set of Python scripts from GitHub repository.
  - Executing Python scripts on a terminal emulator on your computer.

Are you new to Python programming?

- If you are new to Python programming, following booklet is recommended for your reading.
  - "The Python Tutorial"

"The Python Tutorial"

`https://docs.python.org/3/tutorial/`

- If you prefer to read Chinese version of "The Python Tutorial", try following.

"The Python Tutorial" in Chinese

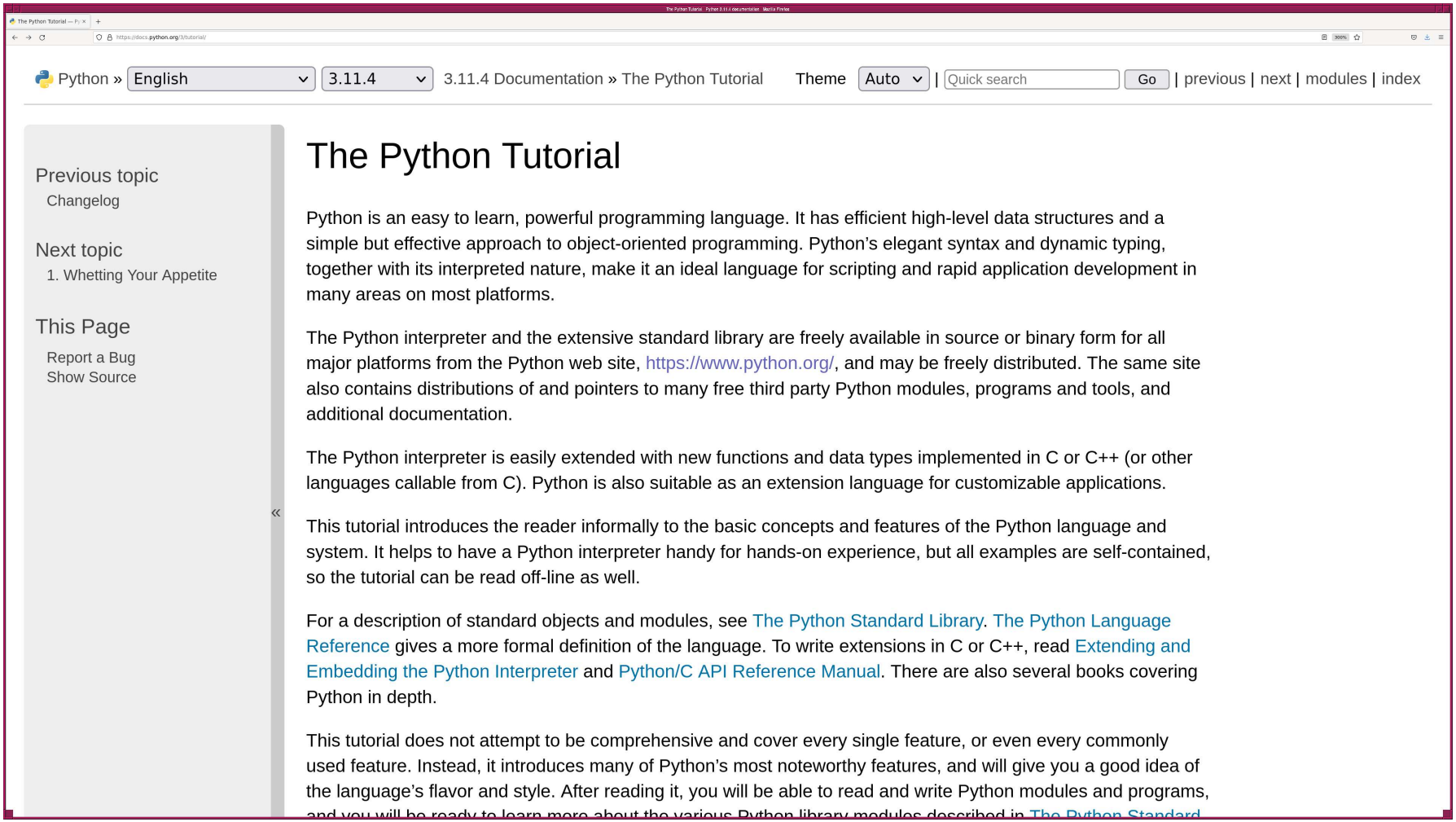
`https://docs.python.org/zh-tw/3/tutorial/`

- If you prefer to download PDF file, visit following page.

A set of PDF files of Python documentation

`https://docs.python.org/3/download.html`

”The Python Tutorial”



https://docs.python.org/3/tutorial/

”The Python Tutorial”

Previous topic
Changelog

Next topic
1. Whetting Your Appetite

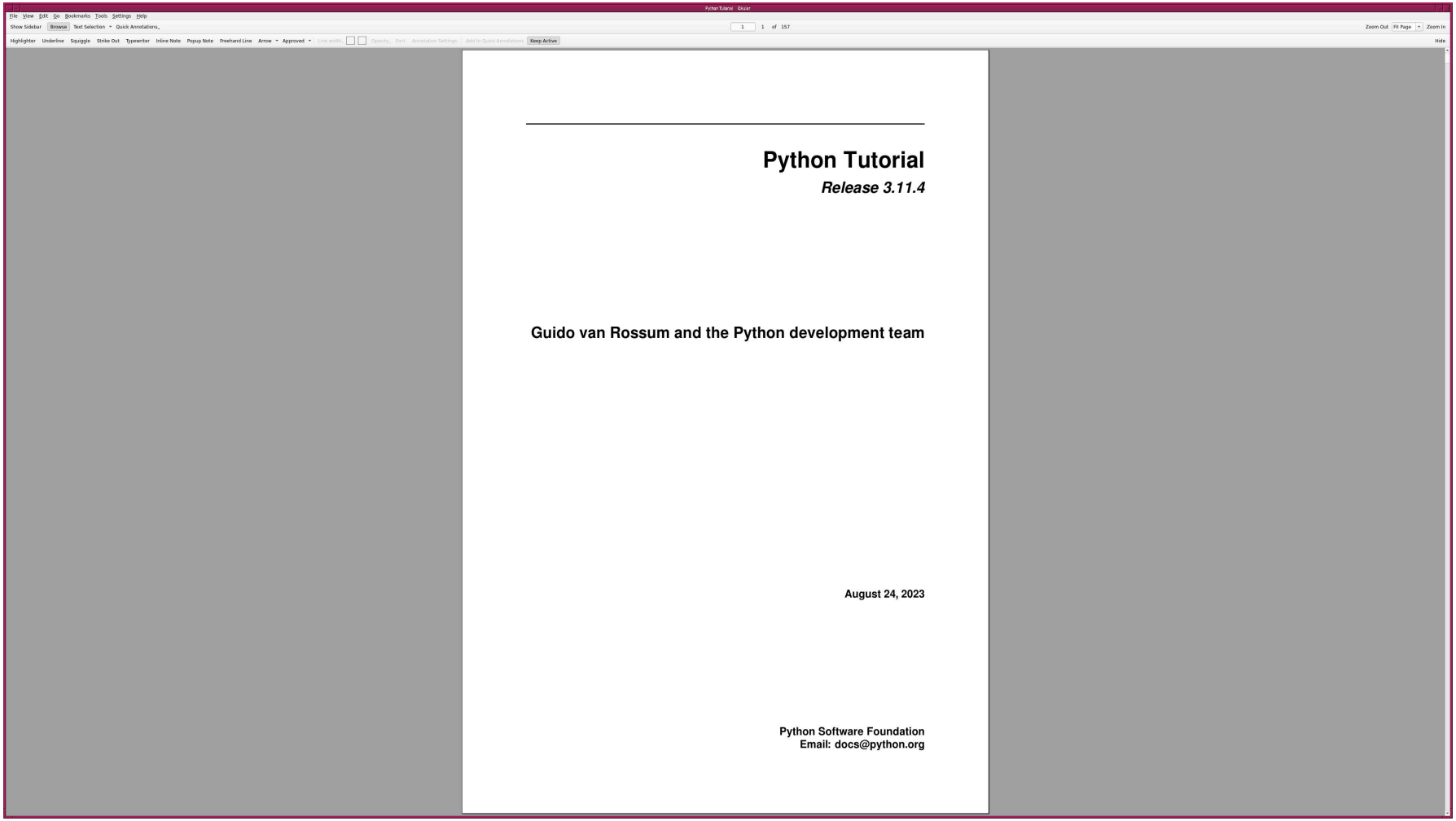
This Page
Report a Bug
Show Source

«

- 1. Whetting Your Appetite
- 2. Using the Python Interpreter
  - 2.1. Invoking the Interpreter
    - 2.1.1. Argument Passing
    - 2.1.2. Interactive Mode
  - 2.2. The Interpreter and Its Environment
    - 2.2.1. Source Code Encoding
- 3. An Informal Introduction to Python
  - 3.1. Using Python as a Calculator
    - 3.1.1. Numbers
    - 3.1.2. Text
    - 3.1.3. Lists
  - 3.2. First Steps Towards Programming
- 4. More Control Flow Tools
  - 4.1. `if` Statements
  - 4.2. `for` Statements
  - 4.3. The `range()` Function
  - 4.4. `break` and `continue` Statements, and `else` Clauses on Loops
  - 4.5. `pass` Statements
  - 4.6. `match` Statements
  - 4.7. Defining Functions
  - 4.8. More on Defining Functions
    - 4.8.1. Default Argument Values
    - 4.8.2. Keyword Arguments
    - 4.8.3. Special parameters
      - 4.8.3.1. Positional-or-Keyword Arguments
      - 4.8.3.2. Positional-Only Parameters
      - 4.8.3.3. Keyword-Only Arguments
      - 4.8.3.4. Function Examples

`https://docs.python.org/3/tutorial/`

”The Python Tutorial”



Python Tutorial

Release 3.11.4

Guido van Rossum and the Python development team

August 24, 2023

Python Software Foundation
Email: docs@python.org

“The Python Tutorial” in PDF format (157 pages)

Some more books for your reading

- Here are some more books about introductory Python programming for you.

“Learning Python”

`https://www.oreilly.com/library/view/learning-python-5th/9781449355722/`

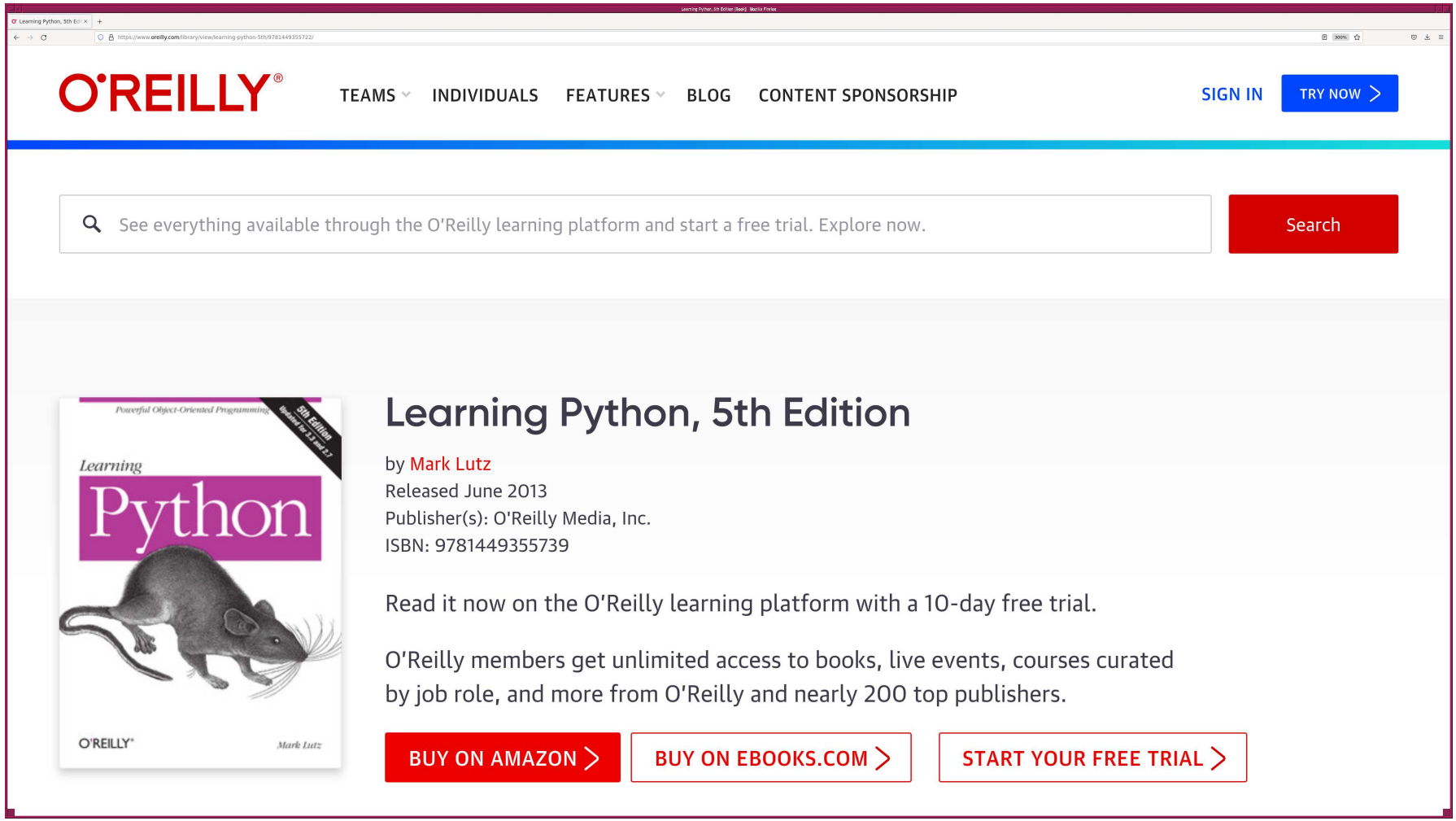
”Programming Python”

`https://www.oreilly.com/library/view/programming-python-second/0596000855/`

”Python Cookbook”

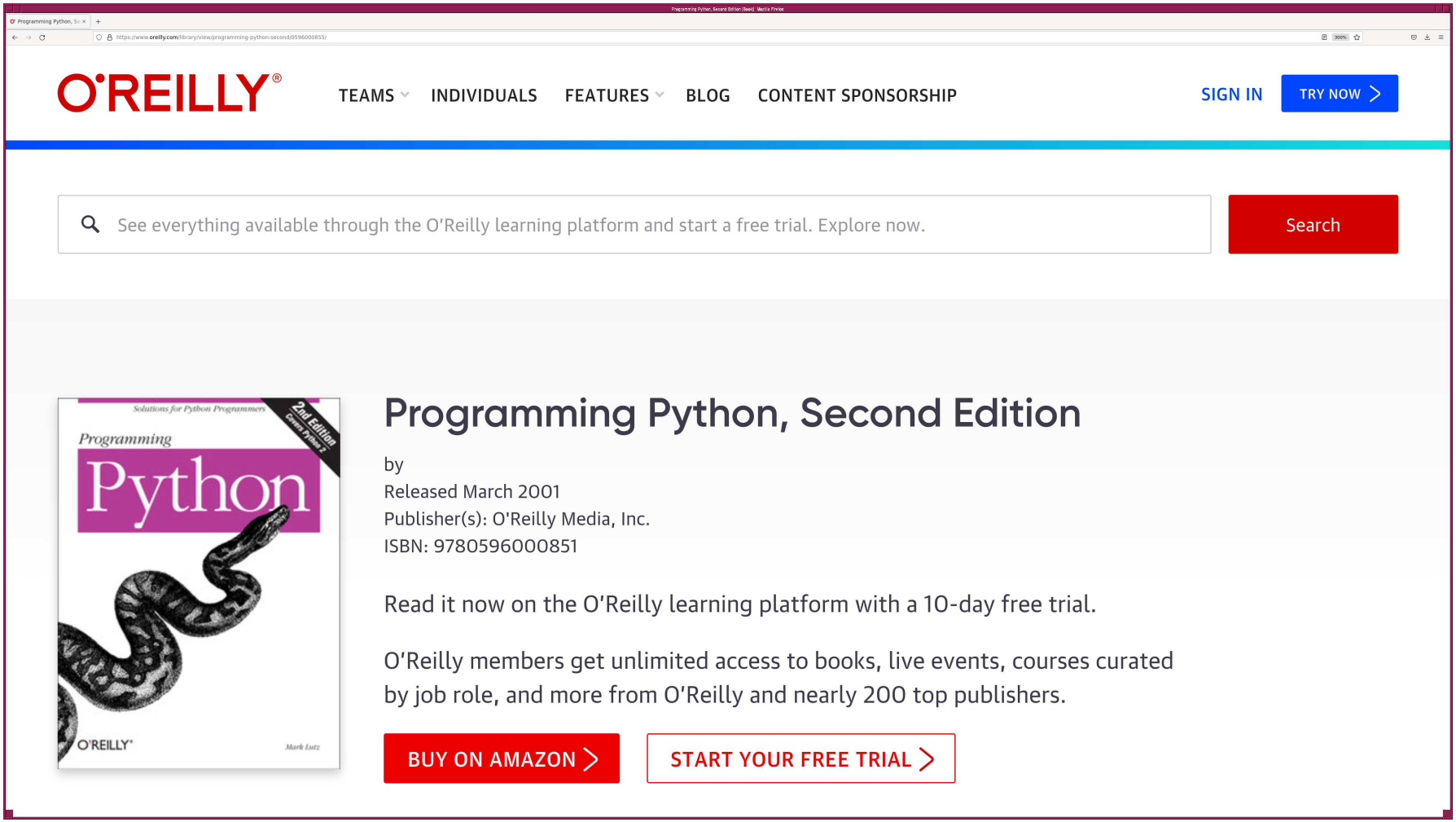
`https://www.oreilly.com/library/view/python-cookbook-3rd/9781449357337/`

“Learning Python”



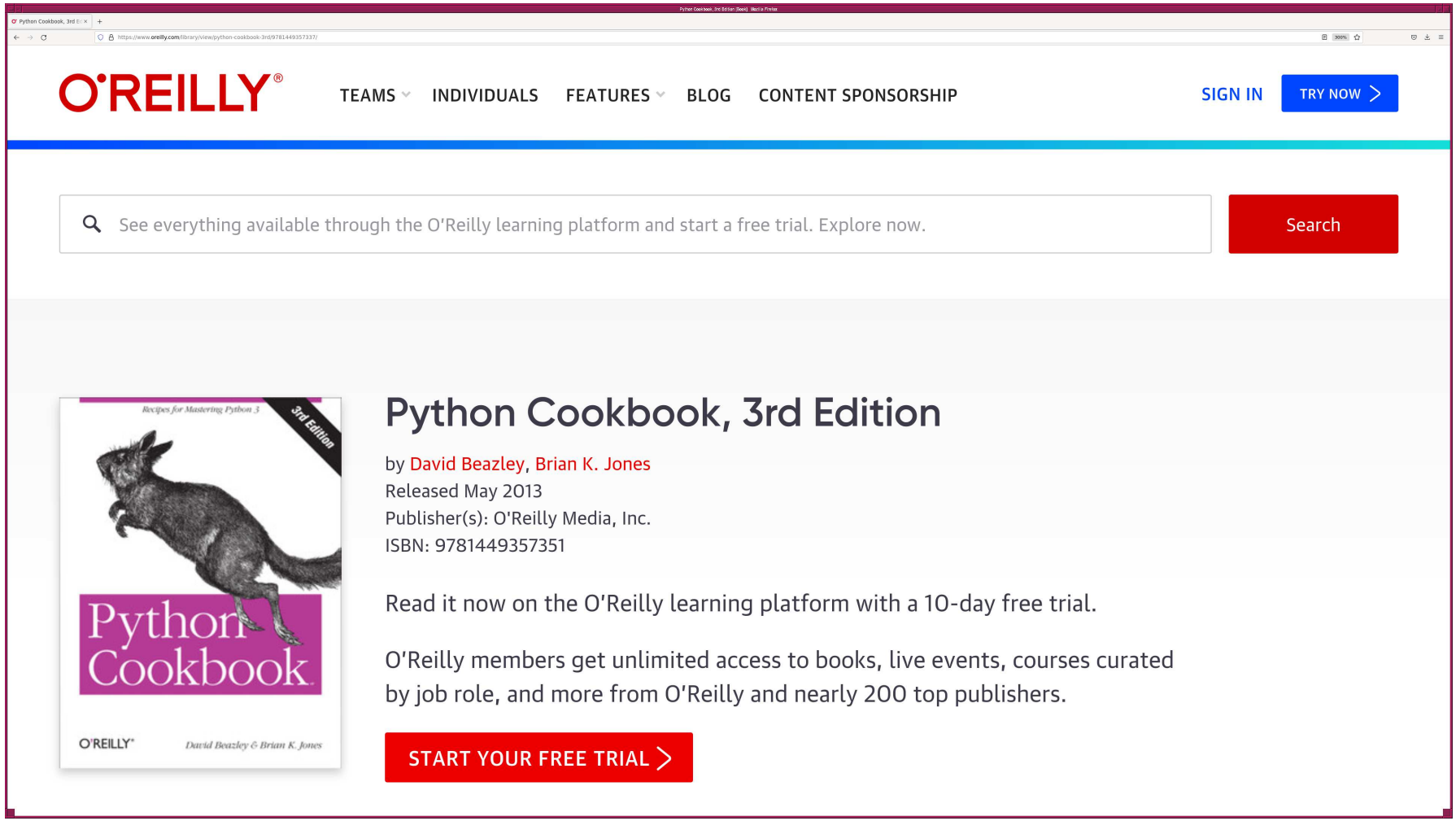
https://www.oreilly.com/library/view/learning-python-5th/9781449355722/

“Programming Python”



https://www.oreilly.com/library/view/programming-python-second/0596000855/

“Python Cookbook”



`https://www.oreilly.com/library/view/python-cookbook-3rd/9781449357337/`

Are you new to Python programming?

- Do you need any assistance?
  - If you need a crash course on introductory Python programming, come and talk to me.
  - If any of you need a crash course on introductory Python programming, we may arrange such a crash course.
    - in the classroom or online depending on your preference
    - date/time can be discussed

Programming camp at Lulin Observatory

- Programming camp at Lulin Observatory
  - If any of you is willing to join, we may arrange "Programming Camp" at Lulin Observatory in winter vacation.
    - 3-day or 4-day activity
    - concentrating on programming at Lulin Observatory
  - If you are willing to participate the activity, come and talk to me.
    - If nobody shows interest, then we do not organise the activity.
  - Lulin Observatory

Lulin Observatory

`https://www.lulin.ncu.edu.tw/`

Classes on 18/Sep and 25/Sep

- I need to go to the high school for teaching in the morning on 18 and 25 September 2023.
- Therefore, I need to discuss with you to reschedule classes on 18 and 25 September 2023.
- Is it OK to start classes at 17:00 on 18 and 25 September 2023?
  - from 17:00 to 19:50 on 18/Sep/2023
  - from 17:00 to 19:50 on 25/Sep/2023
- If any of you is not available at 17:00 on 18 and 25 September 2023, then we try to find the other time-slots.

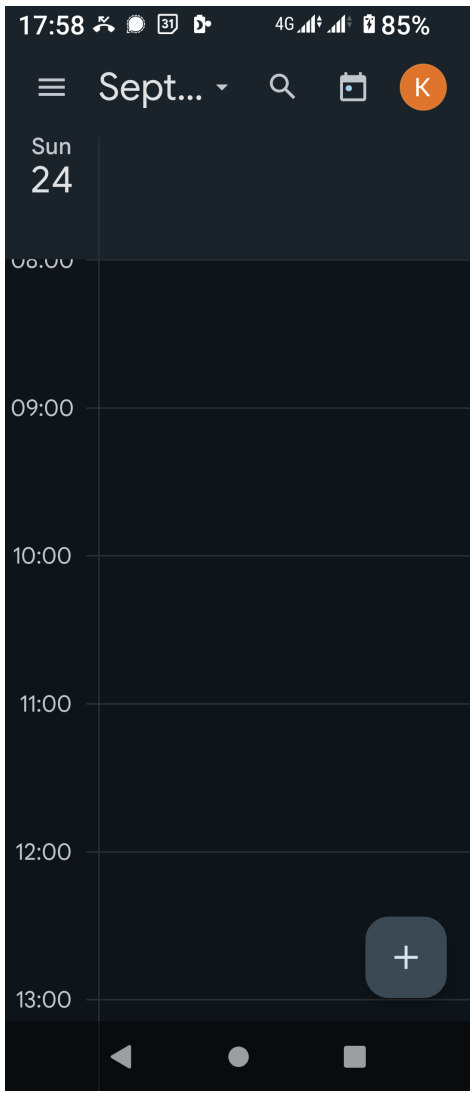
Have a good use of Google Calendar

- You need to submit a set of exercises within two weeks.
  - Do not forget the deadline.
- Have a good use of Google Calendar (or something similar).

Making an event on Google Calendar

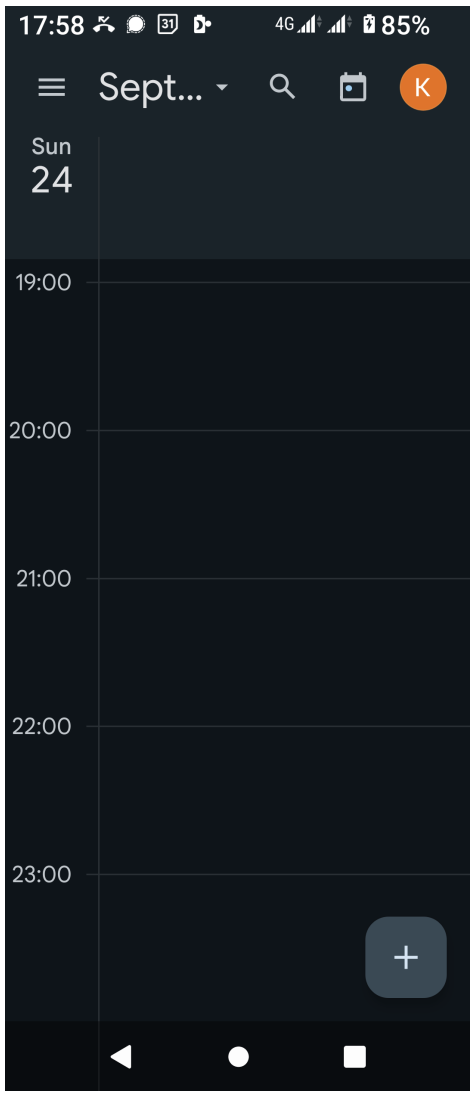
- Tap the icon of Google Calendar on your mobile phone.
- Then, you see a calendar.
- Tap a date on the calendar.

Making an event on Google Calendar



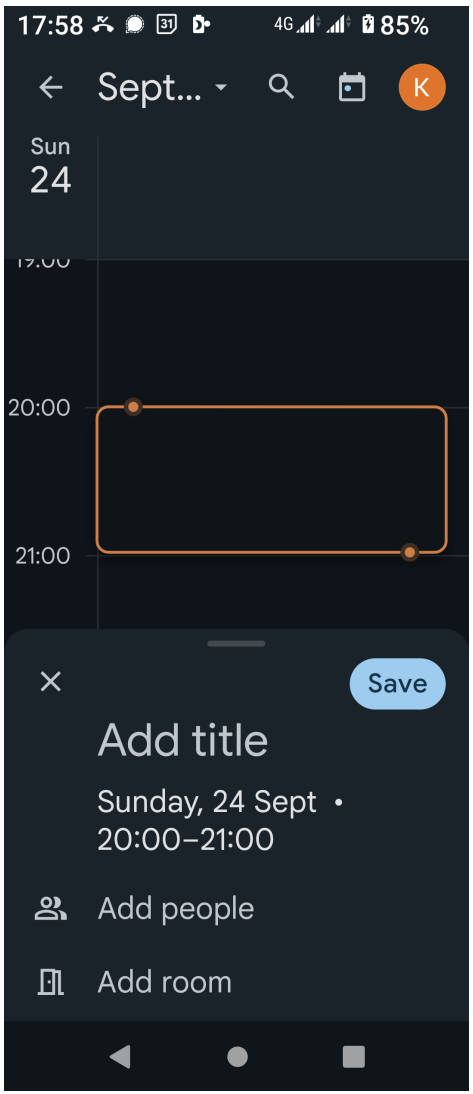
- Now, you see a calendar of a specific date.

Making an event on Google Calendar



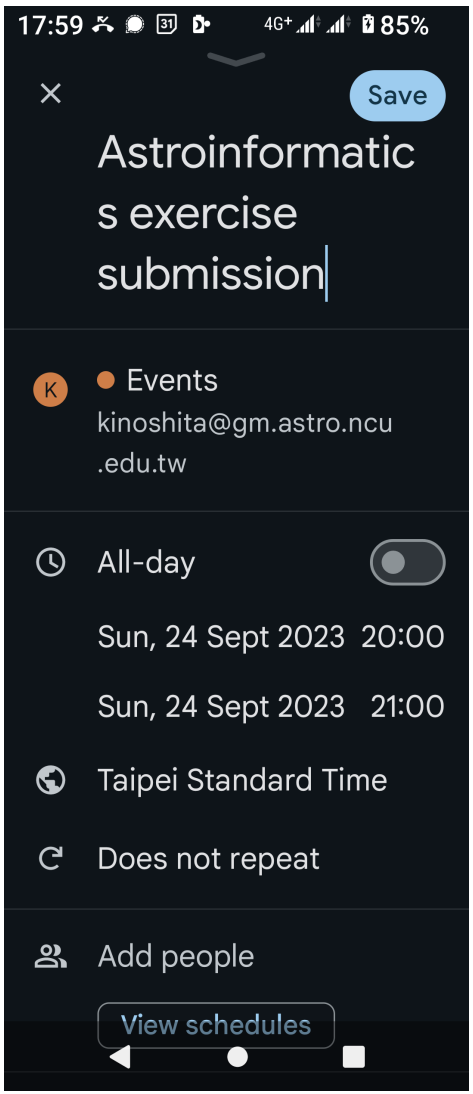
- Scroll down to the time that you would like to make an event.

Making an event on Google Calendar



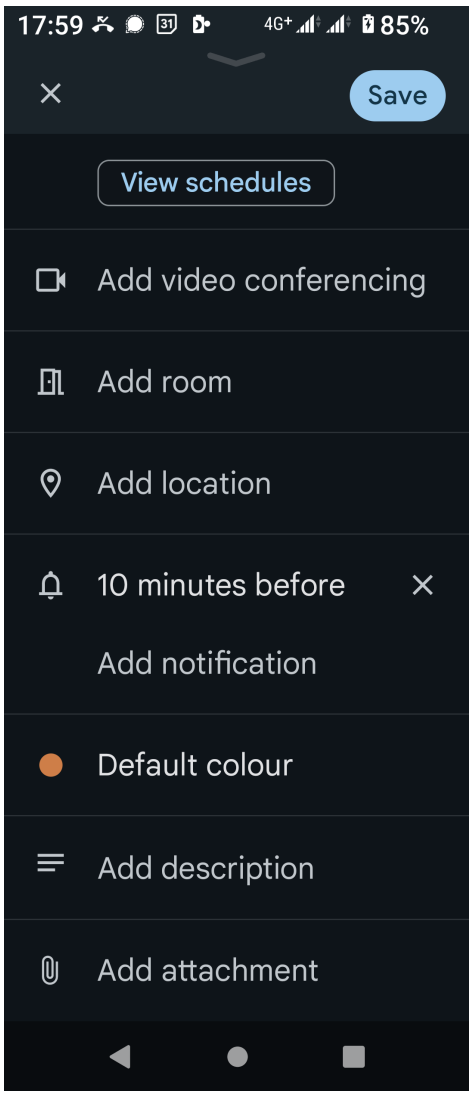
- Tap the time.

Making an event on Google Calendar



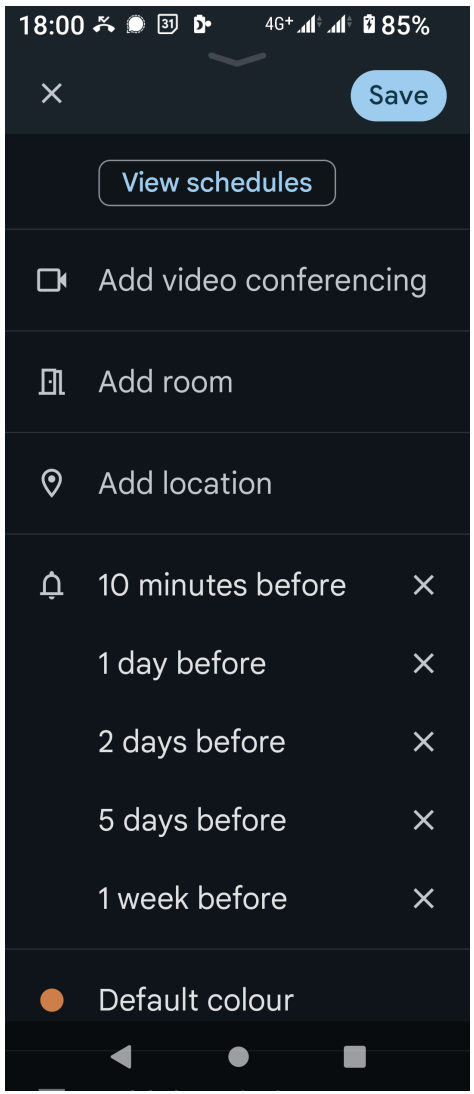
- Type event name.

Making an event on Google Calendar



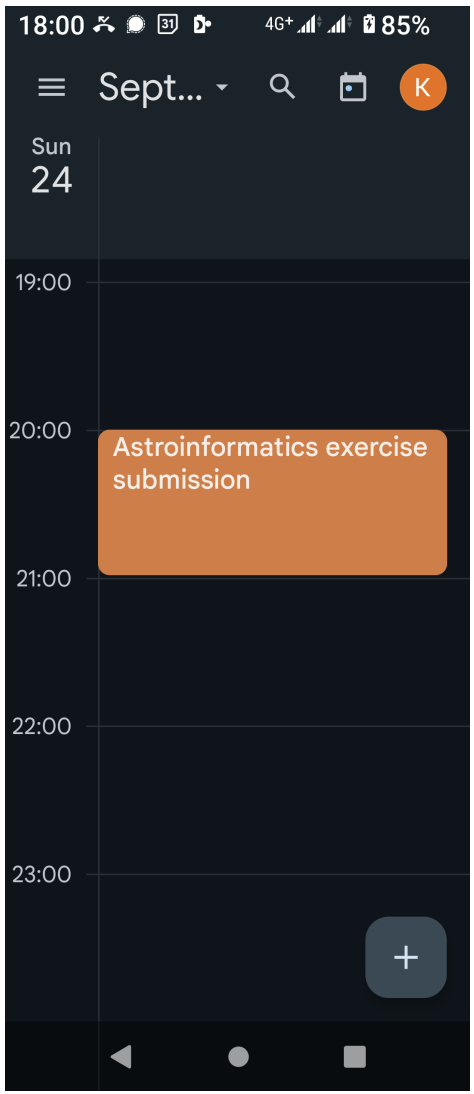
- Scroll down to find the notification setting.

Making an event on Google Calendar



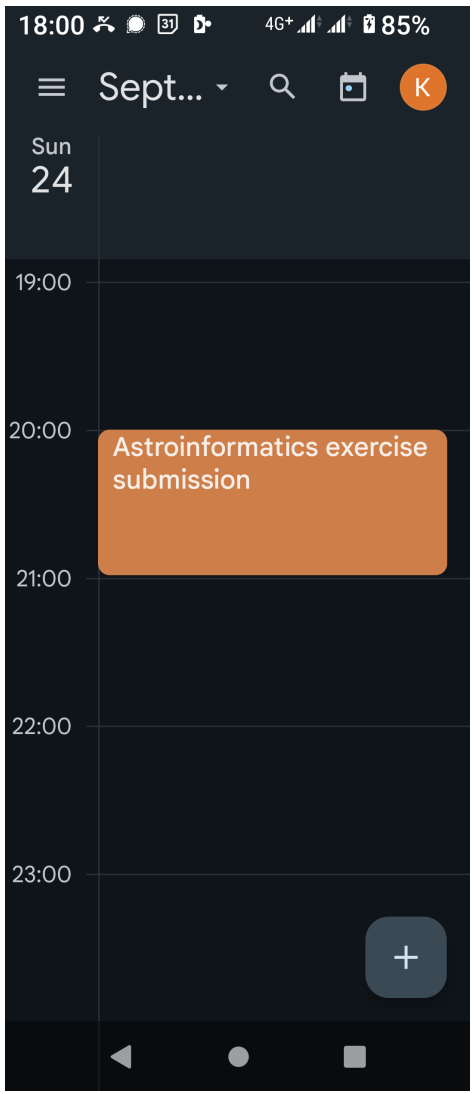
- Set notifications.
- Then, tap the “Save” button.

Making an event on Google Calendar



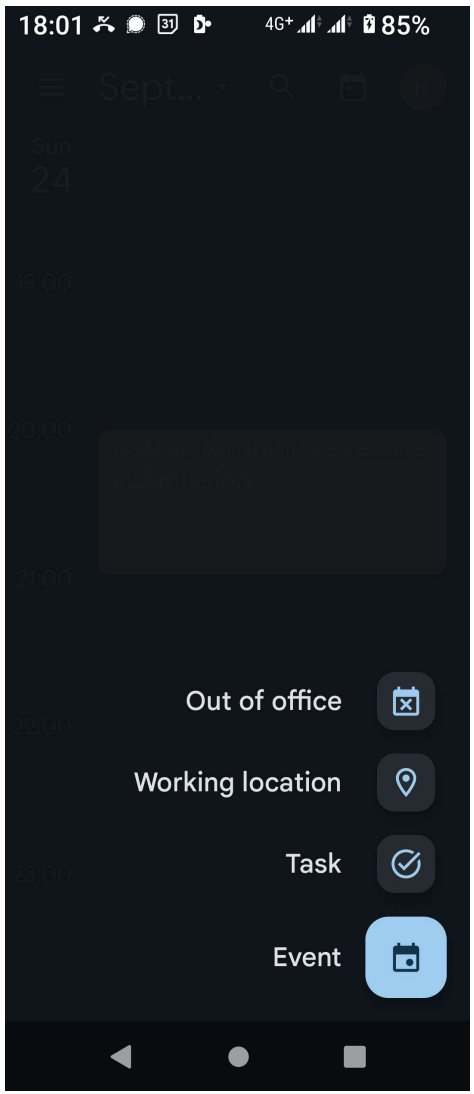
- Now, you have an event.
- You will get notifications and do not forget about the event.

Making a task on Google Calendar



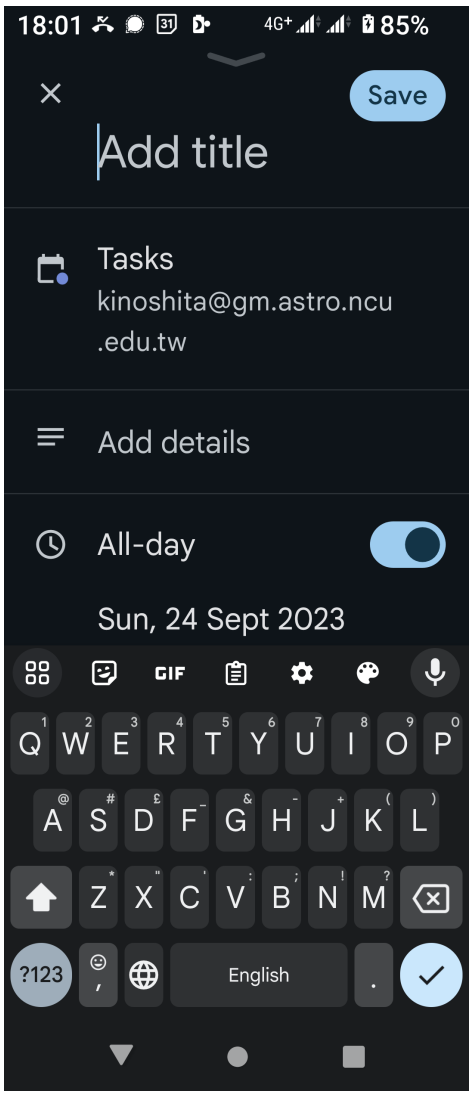
- It is also a good idea to make a task on Google Calendar.
- Tap “+” button.

Making a task on Google Calendar



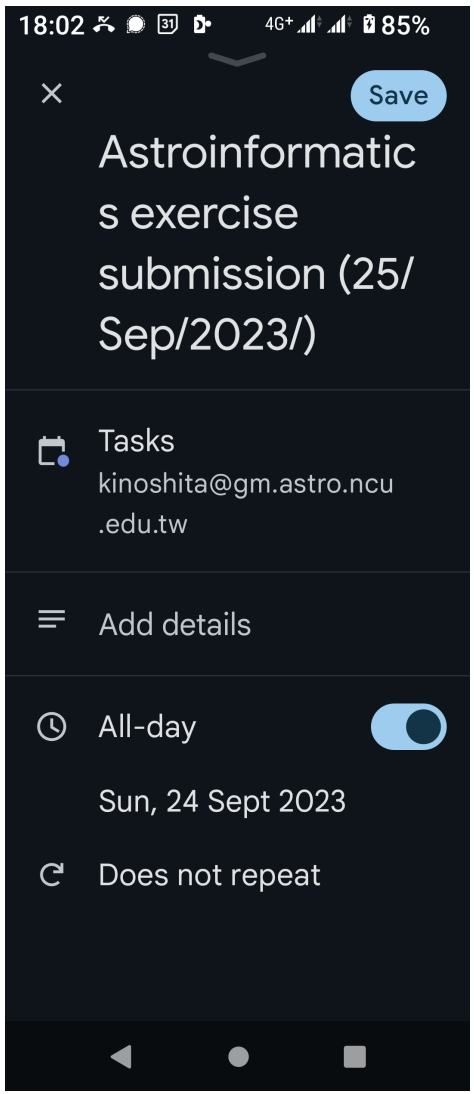
- Tap “Task” icon.

Making a task on Google Calendar



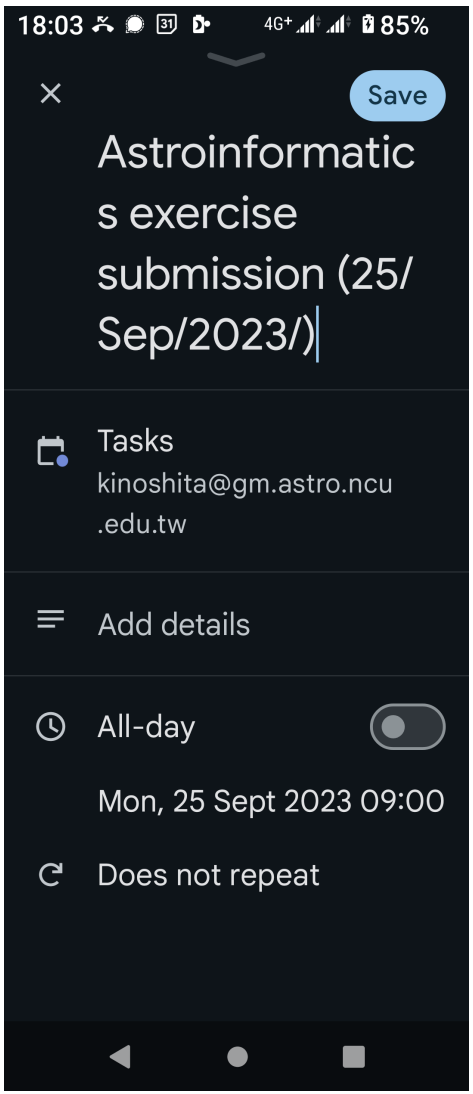
- Now, you can create a new task.

Making a task on Google Calendar



- Type task name.

Making a task on Google Calendar



- Set the time if necessary.
- Then, tap the button “Save”.

Enjoy the course!

Enjoy Python programming!

And, enjoy astronomy!