

Development and calibration of tumor models

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Working with Python

- Introduction to Python
- Solving Ordinary Differential Equations

Python advantages and disadvantages

Advantages

- Interpreted language
- Easy to read, learn and write
- Dynamically typed
- Free and open-source
- Vast libraries support
- Portability

Disadvantages

- Interpreted language
- Slow speed
- Not memory efficient
- Runtime errors

A web-based, interactive computing tool for capturing the whole computation process: developing, documenting, and executing code, as well as communicating the results.

Jupyter Notebook

jupyter example Last Checkpoint: a few seconds ago (autosaved)



Logout

File Edit View Insert Cell Kernel Help

Trusted

Python 3



In []:

Jupyter Notebook

jupyter example Last Checkpoint: 2 minutes ago (autosaved)



Logout

Trusted

Python 3

File Edit View Insert Cell Kernel Help



Code
Code
Markdown
Raw NBConvert
Heading

In []:





Logout

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Trusted | Python 3



Day 02 ## Python

```
\begin{equation}
\frac{\partial \phi}{\partial t} = x\phi
\end{equation}
```

In []: var=2

In []: print(var)
var=3

In []: print(var)
var=4

In []:

jupyter example Last Checkpoint: 24 minutes ago (unsaved changes)



Logout

File Edit View Insert Cell Kernel Help

Trusted

Python 3



Day 02

Python

$$\frac{\partial \phi}{\partial t} = x\phi$$

In [1]: `var=2`

In [2]: `print(var)`
`var=3`

2

In [3]: `print(var)`
`var=4`

3

In []:

Jupyter Notebook

jupyter example Last Checkpoint: 24 minutes ago (unsaved changes)



Logout

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Trusted

Python 3



Day 02

Python

$$\frac{\partial \phi}{\partial t} = x\phi$$

In [1]: `var=2`

In []: `print(var)`
`var=3`

In [2]: `print(var)`
`var=4`

2

In []:

jupyter example Last Checkpoint: 24 minutes ago (unsaved changes)



Logout

File Edit View Insert Cell Kernel Help

Trusted

Python 3



Day 02

Python

$$\frac{\partial \phi}{\partial t} = x\phi$$

In [1]: `var=2`

In [3]: `print(var)`
`var=3`

4

In [2]: `print(var)`
`var=4`

2

In []:

jupyter day02_python (autosaved)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 O

Download GitHub Binder

Memory: 115 / 2048 MB

Day 02

Python

$$\frac{\partial \phi}{\partial t} = x\phi$$

```
In [1]: var=2
```

```
In [2]: print(var)
var=3
```

```
2
```

```
In [ ]: print(var)
var=4
```

```
In [ ]:
```

The screenshot shows a Jupyter Notebook interface. At the top, there's a toolbar with various icons for file operations like Open, Save, and Run, followed by a dropdown menu labeled 'Code'. To the right of the toolbar is a red box highlighting three buttons: 'Download' (with a cloud icon), 'GitHub' (with a GitHub icon), and 'Binder' (with a circular icon). Below the toolbar, the main area displays a section titled 'Day 02' and 'Python'. It contains a mathematical equation $\frac{\partial \phi}{\partial t} = x\phi$. Below the equation are two code cells. The first cell, In [1], contains the assignment `var=2`. The second cell, In [2], contains the command `print(var)`, which outputs the value `3`. A third cell, In [], contains the command `print(var)` again, with `var=4` indicated below it. A fourth cell, In [], is currently empty. At the bottom of the interface, there are navigation icons for back, forward, and search.

Jupyter Notebook - Binder (10 min)

jupyter day02_python (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 Memory: 67 / 2048 MB

Run Cell Code

Day 02

Python

$$\frac{\partial \phi}{\partial t} = x\phi$$

```
In [1]: var=2
In [2]: print(var)
var=3
2
In [*]: print(var)
var=4
In [ ]:
```

The screenshot shows a Jupyter Notebook interface with the title "jupyter day02_python (unsaved changes)". The top menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Trusted, and Python 3. The status bar indicates "Memory: 67 / 2048 MB". The toolbar features icons for file operations like Open, Save, and Print, along with Run, Cell, and Code buttons. A blue arrow points to the Run button, and a red arrow points to the Cell button. The main area displays the text "Day 02" and "Python". Below this, a mathematical equation $\frac{\partial \phi}{\partial t} = x\phi$ is shown. The code cell history includes three cells: In [1] with the assignment `var=2`, In [2] with the print statement `print(var)` resulting in `var=3` and the output `2`, and In [*] with the print statement `print(var)` resulting in `var=4`. A fourth cell, In [], is currently active with an empty input field.

Jupyter Notebook - Binder (12 min)

jupyter day02_python (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help

Not Connected Trusted Python 3 Memory: 67 / 2048 MB

Download GitHub Binder

The screenshot shows a Jupyter Notebook interface with the following elements:

- Title Bar:** "jupyter day02_python (unsaved changes)"
- Toolbar:** File, Edit, View, Insert, Cell, Kernel, Widgets, Help, Download, GitHub, Binder.
- Header:** Not Connected, Trusted, Python 3, Memory: 67 / 2048 MB
- Content Area:** Day 02, Python. It contains three code cells:
 - In [1]: `var=2`
 - In [2]: `print(var)`
Output: 2
 - In [*]: `print(var)`
Output: 4
- Bottom Navigation:** A set of small navigation icons.

Two arrows point to the "Download" and "GitHub" buttons in the toolbar.

Jupyter Notebook - Binder and Discord

<https://github.com/ernesto-lima/veraoIncc2021>

The screenshot shows a Discord server interface. At the top, there's a header bar with the text '#mini-course-1 - Discord' and various icons for notifications, search, and user management. The main window displays a channel named '#mini-course-1'. A message in this channel reads: 'Bem-vindo(a) a #mini-course-1! Este é o começo do canal #mini-course-1. MC01-CT: Development and Calibration of Tumor Models (Desenvolvimento e Calibração de Modelos Tumorais).'. Below this message, there's a section for 'Professores:' listing 'Anna Claudia Resende' and 'Ernesto Lima (UT at Austin) e Emanuelle Arantes Paixão (LNCC)'. There are also sections for 'Horários:', 'Os principais objetivos deste minicurso são:', and 'Ementa:', each containing several bullet points of text. On the left side of the screen, there's a sidebar with a sidebar header 'EMMCT 2021' and a list of channels: '# admin', '# panelist-messages', '# Admin Voice Channel', '# panelist-messages', '# Panelist Voice Channel', '# helpdesk', '# announcements', '# event-agenda', '# posters', '# mini-course-1', '# mini-course-2', and '# random-talk'. On the right side, there are several lists of users categorized as 'HELPDESK--2', 'ORGANIZER--2', 'PANELIST--1', 'DISPONIVEL--7', and 'OFFLINE--52', each with their names and profile pictures.