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# TeachBook (Chem- istry Sciences Template)

Faculty of Sciences

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# CONTENTS

<b>I Tutorial</b>	<b>3</b>
<b>1 What is a TeachBook?</b>	<b>5</b>
1.1 Key Features . . . . .	5
1.2 Why use this template? . . . . .	5
1.3 Underlying Technology . . . . .	5
<b>2 Editing Workflow</b>	<b>7</b>
2.1 Recommended Steps . . . . .	7
2.2 Tools . . . . .	7
<b>3 Editing with AI</b>	<b>9</b>
3.1 Prompts for the Assistant . . . . .	9
3.2 Prompt Example . . . . .	9
<b>4 Web Publication</b>	<b>11</b>
4.1 Steps to publish . . . . .	11
<b>II Examples by Degree</b>	<b>13</b>
<b>5 Degree in Physics</b>	<b>15</b>
5.1 Physics Example: Harmonic Oscillator . . . . .	15
<b>6 Degree in Mathematics</b>	<b>17</b>
6.1 Mathematics Example: Symbolic Calculus . . . . .	17
<b>7 Degree in Statistics</b>	<b>19</b>
7.1 Statistics Example: Data Generation . . . . .	19
<b>III Information</b>	<b>21</b>
<b>8 About</b>	<b>23</b>
8.1 Authors . . . . .	23
8.2 Contexto . . . . .	23
8.3 Year . . . . .	23
<b>9 Licenses</b>	<b>25</b>
9.1 Content . . . . .	25
9.2 Code . . . . .	25
9.3 Attributions . . . . .	25

<b>10 How to Cite</b>	<b>27</b>
10.1 Text Citation . . . . .	27
10.2 BibTeX . . . . .	27
10.3 DOI . . . . .	27

Welcome to the **TeachBook Sciences Template**.

## What is this?

This is a template designed for the faculty of the **Faculty of Sciences at USAL** to create interactive teaching books easily.

## Content

In this book you will find:

- *Tutorials* to learn how to use the template
- *Examples by Degree* to see real cases
- Information on *how to cite* and *licenses*

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**Note:** This project is designed to be used with **VS Code** and **AI** assistants.

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# **Part I**

# **Tutorial**



## WHAT IS A TEACHBOOK?

A TeachBook is an interactive open educational resource designed to facilitate learning.

### 1.1 Key Features

- **Web Format:** Accessible from any device (computer, tablet, mobile).
- **Interactive:** Allows execution of code (Python) directly in the browser.
- **Downloadable:** Can be exported to PDF for offline reading.

### 1.2 Why use this template?

This template is pre-configured with:

1. **USAL Design:** Colors and typography aligned with the corporate identity.
2. **Tools:** Includes matplotlib, numpy, pandas ready to use.
3. **AI Integration:** Designed to be edited with the help of AI assistants. from the source code.

### 1.3 Underlying Technology

This project uses [Jupyter Book](#), a standard tool in the scientific community.



## EDITING WORKFLOW

The workflow with **TeachBook** is designed to be simple and efficient.

### 2.1 Recommended Steps

1. **Write content:** Use Markdown or Notebooks (`.ipynb`).
2. **Preview:** Run `python scripts/preview_book.py` to see changes in real-time.
3. **Commit & Push:** Use the Git extension in VS Code to save your work.
4. **Deploy:** GitHub Actions will automatically publish the updated version.

### 2.2 Tools

- **VS Code:** Main editor.
- **Jupyter Extension:** For editing notebooks interactively.
- **GitHub:** For version control and hosting.
- `_toc.yml`: Table of Contents.
- `_config.yml`: General configuration.



## **EDITING WITH AI**

This template is optimized for use with Artificial Intelligence assistants (like GitHub Copilot, ChatGPT, or Claude).

### **3.1 Prompts for the Assistant**

You can ask the assistant to:

- “Create a new chapter about Thermodynamics.”
- “Add a matplotlib graph to visualize this function.”
- “Correct the style of this paragraph.”

The assistant knows the project structure thanks to the `Agent.md` file.

### **3.2 Prompt Example**

“Create a code cell that plots the standard normal distribution using matplotlib.”

The AI will give you the code and you just have to run it or include it in your book.



## WEB PUBLICATION

Publication is done automatically through **GitHub Pages**.

### 4.1 Steps to publish

1. Ensure your repository is public (or you have access to GitHub Pages in private).
2. Make changes to your content.
3. Save changes with a **Commit** and **Push** to the main branch (main).
4. A “GitHub Action” will run automatically and build your book.
5. In a few minutes, you will see your updated book at your repository URL (configured in Settings > Pages).



## **Part II**

# **Examples by Degree**



## DEGREE IN PHYSICS

In this section, you will find examples adapted to Physics Degree courses. The goal is to show how to integrate:

- Complex mathematical formulas
- Plots of physical simulations
- Experimental data analysis code

### 5.1 Physics Example: Harmonic Oscillator

This notebook simulates a simple harmonic oscillator.

```
import numpy as np
import matplotlib.pyplot as plt

# Parameters
k = 1.0 # Spring constant
m = 1.0 # Mass
omega = np.sqrt(k / m)
t = np.linspace(0, 20, 100)

# Position
x = np.cos(omega * t)

# Plot
plt.figure(figsize=(8, 4))
plt.plot(t, x)
plt.title('Simple Harmonic Oscillator')
plt.xlabel('Time (s)')
plt.ylabel('Position (m)')
plt.grid(True)
plt.show()
```



## DEGREE IN MATHEMATICS

Examples for mathematics courses. Priorities here include:

- Rigor in mathematical notation (LaTeX)
- Visual proofs
- Symbolic algorithms (SymPy)

### 6.1 Mathematics Example: Symbolic Calculus

We will use SymPy to differentiate and integrate functions.

```
from sympy import symbols, diff, integrate, sin, exp

x = symbols('x')
f = exp(-x) * sin(x)

# Derivative
df = diff(f, x)
print(f"Derivative: {df}")

# Indefinite Integral
int_f = integrate(f, x)
print(f"Integral: {int_f}")
```



## DEGREE IN STATISTICS

Examples oriented towards data analysis and probability. Highlights:

- DataFrame handling (Pandas)
- Statistical visualization (Seaborn)
- Probabilistic models

### 7.1 Statistics Example: Data Generation

We generate a normal distribution and visualize its histogram.

```
import numpy as np
import matplotlib.pyplot as plt

data = np.random.normal(0, 1, 1000)

plt.hist(data, bins=30, alpha=0.7, color='green', density=True)
plt.title('Normal Distribution Histogram')
plt.xlabel('Values')
plt.ylabel('Density')
plt.show()
```



# **Part III**

# **Information**



## 8.1 Authors

**Facultad de Ciencias** Universidad de Salamanca (USAL)

## 8.2 Contexto

This book is part of the teaching innovation project for the integration of digital tools in science teaching.

## 8.3 Year

2025



## LICENSES

### 9.1 Content

All text and image content (unless otherwise stated) is distributed under a **Creative Commons Attribution 4.0 International (CC BY 4.0)** license.

### 9.2 Code

Source code examples are distributed under the **MIT** license.

### 9.3 Attributions

This project uses:

- [Jupyter Book](#)
- [The Turing Way \(as inspiration\)](#)



## HOW TO CITE

If you use this material, please cite it as follows:

### 10.1 Text Citation

Faculty of Sciences (2025). *TeachBook Sciences Template*. University of Salamanca. Available at: [Repository URL]

### 10.2 BibTeX

```
@book{teachbook_sciences_2025,  
  author = {Faculty of Sciences},  
  title = {TeachBook Sciences Template},  
  year = {2025},  
  publisher = {University of Salamanca},  
  url = {https://github.com/user/repo}  
}
```

### 10.3 DOI

(Pending assignment via Zenodo)