Getting Started with Google Colab

A Cloud-Based Python Environment for Computational Mechanics

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Why Google Colab?

- Zero local installation of Python or packages
- Runs entirely in a web browser
- Ideal for short experiments, demonstrations, and homework
- Provides access to modern hardware (CPUs, GPUs)

Colab complements—not replaces—local virtual environments.

What Is Google Colab?

- A hosted Jupyter Notebook environment
- Backed by Google Cloud infrastructure
- Integrated with Google Drive
- Supports Python and standard scientific libraries

Key Idea

Colab allows you to focus on *computing*, not configuration.

When Should You Use Colab?

- First exposure to Python and Jupyter
- Short computational exercises
- Rapid prototyping and experimentation
- Working on shared notebooks

Not Recommended For

Long-term projects, reproducible research pipelines, or package development.

Creating a New Colab Notebook

1. Navigate to `https://colab.research.google.com`
2. Sign in with a Google account
3. Select **New Notebook**
4. Rename the notebook immediately

Notebook files are saved as `.ipynb` files in Google Drive.

The Colab Interface

- Code cells (Python execution)
- Markdown cells (documentation and equations)
- Runtime menu (execution environment)
- File browser panel

Tip

Use Markdown cells generously to document your work.

Installing Packages in Colab

Most scientific packages are pre-installed:

- NumPy
- SciPy
- Matplotlib
- Pandas
- SymPy

Additional packages can be installed using:

Example

```
!pip install package-name
```

How Colab Runs Your Code

- Your Python code runs on a remote computer, not your laptop
- By default, Colab uses a standard processor that works for most tasks
- You usually do **not** need to change any settings

Important

For this course, the default Colab settings are sufficient.

Working with Files

- Upload files manually
- Mount Google Drive
- Download results to local machine

Mounting Google Drive

```
from google.colab import drive
drive.mount('/content/drive')
```

Limitations of Google Colab

- Sessions are temporary
- Files may be deleted when runtime disconnects
- Limited control over system configuration

Always save important work to Google Drive or download it.

Colab vs Local Python Environments

	Colab	Local Environment
Setup required	None	Yes
Reproducibility	Moderate	High
Offline use	No	Yes
Customization	Limited	Full

Best Practices for This Course

- Use Colab for exploration and learning
- Use local environments for serious projects
- Keep notebooks clean and well-documented
- Download and archive important results

Summary

- Google Colab provides instant access to Python
- Ideal for getting started quickly
- Complements professional workflows

Next Step

Open Colab and run your first notebook.