

# Computational Geosciences

Welcome to the Computational Geosciences resource at the University of Stavanger (UiS), Norway. This is an educational project funded by the Faculty of Science and Technology at UiS. The resource is made by students and faculty from the departments of Energy Resources (IER) and Mechanical and Structural Engineering (IMBM).

Students: Angela Hoch (IER), Adham Amer (IMBM), Vania Mansoor and Linda Olsen (IER).

Postdocs: David Oakley (IER)

Faculty: Nestor Cardozo (IER), Lisa Watson (IER), Wiktor Weibull (IER), and Knut Giljarhus (IMBM).

Please feel free to use this material for teaching and research. If you have any comments or want to contribute to the resource, please contact us at [nestor.cardozo@uis.no](mailto:nestor.cardozo@uis.no)

## Manual: Working with the resource

The resource consists of a book in pdf format (compGeo.pdf), and a source folder where data, functions and notebooks are included. The book is a large, full-resolution file (22 MB).

The programming language of choice is Python, and our approach is as follows: We introduce briefly the theory and applications, implement them in Python functions, and illustrate them using Jupyter notebooks. The best way to work with the resource is to clone this repository.

### Clone the repository

This saves the repository to your local machine. It behaves almost like a copy. 1. Open a terminal. 2. Navigate to the folder where you would like to store the local copy of the repository. (`cd <foldername>`) 3. Press the green button 'Clone or download' on the right hand side and copy the path. 4. Execute the terminal command `git clone <fill in path here>`. 5. Now you can start working with the resource files. They are saved in the folder you chose in the 2. step.

### Updating your local files

Once in a while you should update your local files to the latest changes in the repository. This is important since we will be including new chapters along. 1. Open a terminal. 2. Navigate inside

the folder of the repository on your machine. (`cd <foldername>`) 3. Execute the terminal command `git pull`

## Background information

The notebooks follow the directory structure of the resource, which is based on separate data, functions and notebooks folders. We recommend that you follow the same directory structure when running the notebooks. When necessary, we have imported the Numpy and Matplotlib libraries in our functions and notebooks as:

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

We also use other libraries such as Cartopy, pyproj, and uncertainties by Eric O. Lebigot.

To work with the jupyter notebooks of the resource, open jupyter and navigate to the corresponding folder of your local copy of the resource.

## Current state

Currently, nine chapters are published, though chapter 9 (Elasticity) is missing two sections. The last upcoming chapter will be about the inversion problem (Ch. 10).