

## Biophysics 21: Biological Light Microscopy

### Section 10: Image analysis using Python

**Discussion section:** Tuesday 1 – 2.30 pm GH N114

**Labs:** Thursday and/or Friday 1-4pm GH N114

Bring your laptop to both!

My goal is to introduce working with the command line (CLI), git (a source code repository, i.e. a system to keep track of your source code and changes to it), github (a central place for git repositories that can be used to share code with others), Python (currently the most popular programming language that aims to be easy to understand and that is very widely used in data sciences and image analysis), and generative AI to help you create your own analysis code.

This may be overly ambitious for some, and way too simple for others, and it surely is too much for just two sessions, but we will be trying it anyways. I hope that everyone will get something out of this, at the very least some insight into how you can get started with your own image analysis code, and for those with more experience, I hope you will find some useful suggestions in this material.

Below are some videos that you may want to watch as an introduction. The discussion section will contain instructions on how to set up a working environment on your laptop (bring your laptop to both the discussion section and lab), and we will use the discussion session time to work on your environment. If you can, please start working on your environment beforehand. Setting up a working environment is often the most difficult and time-consuming process, but luckily, you need to do this only once.

Why do I need to learn **programming**: [https://www.youtube.com/watch?v=X\\_pCiVQ4c4E](https://www.youtube.com/watch?v=X_pCiVQ4c4E) (4:40).

**CLI:** If you have never used the command line interface (CLI, or shell, or terminal), you will want to watch the following video: <https://www.youtube.com/watch?v=mUXVBMhr7Xg>. Note that the most relevant section starts at 9:30.

**Git:** One of the goals is to install git and get some basic understanding how to work with git and github. The following video gives an introduction:

<https://www.youtube.com/watch?v=r8jQ9hVA2qs> (9:07).

Python: Python for microscopists: <https://www.youtube.com/watch?v=qgJLeDPT8UM> (8:38). Managing environments using uv:

<https://www.youtube.com/watch?v=k0F9YaAbNwo> (12:14). Introduction to using Scikit-image in Python: <https://www.youtube.com/watch?v=CTOURPZftuU> (37:24).

Download link for git: <https://git-scm.com/install/>. Although not essential, you may want an account on github (<https://github.com>). Note that you can join Github education, which may give some useful benefits such as free private repositories.

**Python and Python project management with uv:** One of the major problems working with Python has been the management of dependencies, necessitating working with “virtual environments”, that isolate dependencies. A recent tool “uv” makes this much easier and faster. To get you started with uv, see:

<https://www.youtube.com/watch?v=k0F9YaAbNwo>. Installation link:

<https://docs.astral.sh/uv/getting-started/installation/>