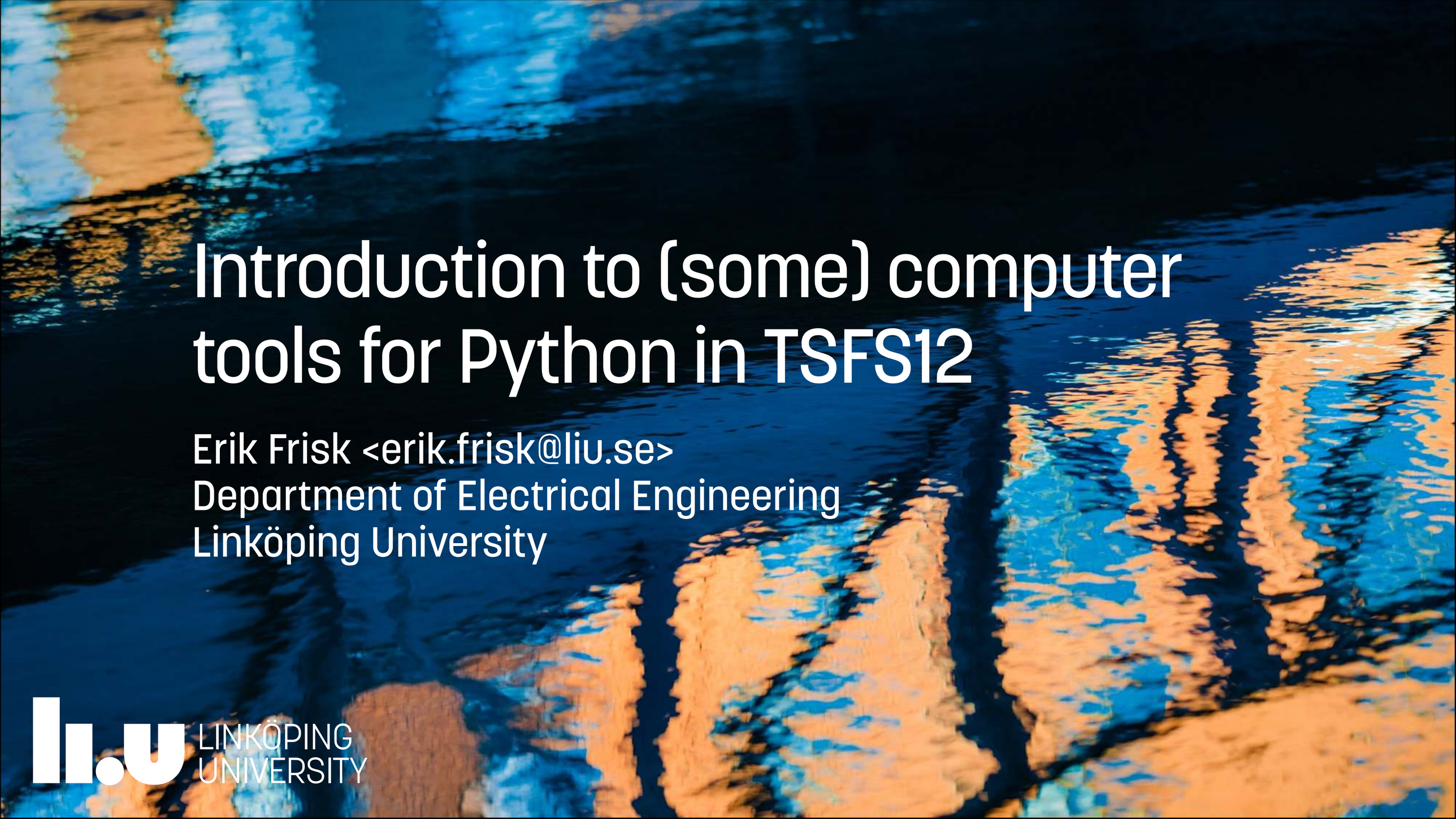

Introduction to (some) computer tools for Python in TSFS12

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Introduction to (some) computer tools

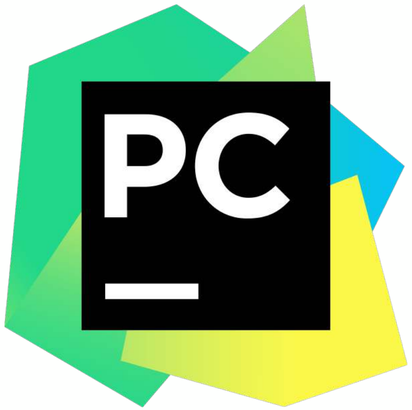
- If you have none, or little, experience in Python before; we support anyone taking the opportunity to learn.
- Bear in mind though that it will probably mean extra work for you. We can help, but this is not a course in Python.
- Experience from previous years:
  some are hindered by not being efficient in the computer tools used
- To help, we include this non-mandatory lecture to get you started. If you are efficient and used to working in Python IDE:s; there will be nothing new for you here.

Introduction to (some) computer tools

- What it is: Introduction to Jupyter notebooks and Visual Studio Code
  - a brief discussion on when they are suitable
  - illustrate on code for the first hand-in — discrete planning
  - a quick guide to how to start configuring Visual Studio Code for Python
- What it isn't: Introduction to Python

Integrated Development Environments

- Three widespread tools (I use) are:
  - Jupyter notebooks (https://jupyter.org)
  - Visual Studio Code (https://code.visualstudio.com)
  - PyCharm (https://www.jetbrains.com/pycharm/)
- Free and available for Windows, Linux, and Mac
- **Jupyter notebooks**
  - Excellent for experimenting, exploring, and light coding
  - Big +: Documentation and code together
  - Big -: Poor debugging alternatives and a very simple editor
- **Visual Studio Code (VSC)**
  - More programming like environment
  - Good debug functionality
- **PyCharm**
  - Same as VSC — I use it for bigger projects (I won't cover it here)



Getting started with the hand-in files

Getting started

Get all files from the repository

```
% mkdir tsfs12_work
% cd tsfs12_work
% git clone https://gitlab.liu.se/vehsys/tsfs12.git
% cd tsfs12
% git pull  # When you want to get all the latest updates
```

If you don't use git, you can also download a zip-file with the repo from https://gitlab.liu.se/vehsys/tsfs12.

Create virtual environment and install all packages needed

```
% cd tsfs12_work
% python -m venv env
% source env/bin/activate  # On Windows: env\Scripts\activate
% (env) pip install -U pip  # Update package manager
% (env) pip install -r requirements.txt  # Install all required packages
```

Jupyter Notebooks

— demo on hand-in 1: Discrete Planning in a Structured Road Network

Some useful information

- Project homepage https://jupyter.org; for usage information go to Documentation->JupyterLab->"The JupyterLab interface" https://jupyterlab.readthedocs.io/en/latest/user/interface.html

Useful shortcuts (there are more)

- Shift-enter — execute cell
- ESC — leave editing mode
- Return — edit cell
- a — add cell above
- b — add cell below
- x — cut cell
- v — paste cell
- Right-click + new console for notebook — get console
- Tab — tab completion, works for almost everything
- Shift-tab — get method help
- m — make cell Markdown, a documentation cell. See, e.g., (https://www.markdownguide.org/basic-syntax/)

Working with imports

- Python caches imports
- If you import your code from a separate file, e.g., planners.py like in the demo, include “ipython magic” at the top

```
%load_ext autoreload
%autoreload 2
```

- Then your changes will take immediate effect
- See https://ipython.org/ipython-doc/3/config/extensions/autoreload.html for more information.

Visual Studio Code

— demo on hand-in 1: Discrete Planning in a Structured Road Network

Visual Studio Code

- A general purpose code editor that is highly configurable and rather useful as a light-weight developer IDE, also for Python
- There are *many* extensions available that you can explore at you own pleasure
- For Python development, I use the recommended, standard, Microsoft "*Python extension for Visual Studio Code*"

Visual Studio Code - custom launch.json

Text in RED is what I added

```
{
    // Use IntelliSense to learn about possible attributes.
    // Hover to view descriptions of existing attributes.
    // For more information, visit: https://go.microsoft.com/fwlink/?linkid=830387
    "version": "0.2.0",
    "configurations": [
        {
            "name": "Python: Current File",
            "type": "python",
            "request": "launch",
            "program": "${file}",
            "console": "integratedTerminal",
            "cwd": "${fileDirname}"
        },
        {
            "name": "Discrete planning",
            "type": "python",
            "request": "launch",
            "program": "${workspaceFolder}/HI1_DiscretePathPlanning/python/main.py",
            "console": "integratedTerminal",
            "cwd": "${workspaceFolder}/HI1_DiscretePathPlanning/python"
        }
    ]
}
```

Take home messages

Short summary - Jupyter notebooks

- Pros
  - available for Windows, Linux, Mac
  - easy, runs in your browser (you can also run notebooks in Visual Studio Code but I won’t cover that here)
  - Supports interactive experimentation & exploration (don’t just run the file)
  - Supports documentation and code in same document.
  - Reports for hand-ins can conveniently be written directly in the notebook.
- Cons
  - very basic editing
  - does not really support debugging or more advanced coding

Short summary - Visual Studio Code

- Pros
  - available for Windows, Linux, Mac
  - Capable editor
  - Full debugging capabilities
  - Supports both interactive (Shift-enter) and running scripts
  - Highly extendable, with capable Python extensions easy to install
- Cons
  - Requires more “low-level” tinkering with configurations
  - Does not support documentation in the session
    (actually, you can run jupyter notebooks also in VSCode but …)

Take-home message

- Both Jupyter and Visual Studio Code are excellent tools
- Different objectives; with different pros and cons.
- These exercises, are they programming or experiments?
  - Personally, I spend more time in VSCode (or PyCharm) than in Jupyter notebooks
- Here: Entirely up to you.
- Submitting reports as notebooks is allowed.
- I will put these slides and link to the recorded video in the course git-repo.