

# Scientific Computing

## Introduction

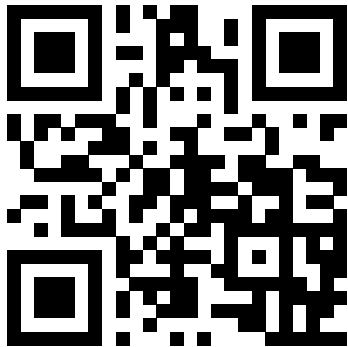
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12.3.2020



## Survey regarding preknowledge



menti.com

1. Who we are
2. What this course is about
3. How the class works
4. Prerequisites
5. How we grade
6. Resources
7. First assignment

# Who we are

Johannes Schmidt <johannes.schmidt@boku.ac.at>

- ▶ Associate Prof. in Energy & Resource Economics at the Institute for Sustainable Economic Development
- ▶ Works on modeling of renewable energy systems in R, GAMS (and Python)
- ▶ Studied Computer Science at TU Wien

# Who we are

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Peter Regner <peter.regner@boku.ac.at>

- ▶ PhD student at the Institute for Sustainable Economic Development
- ▶ Worked almost 7 years as Python developer in semiconductor industry
- ▶ Studied mathematics at TU Wien

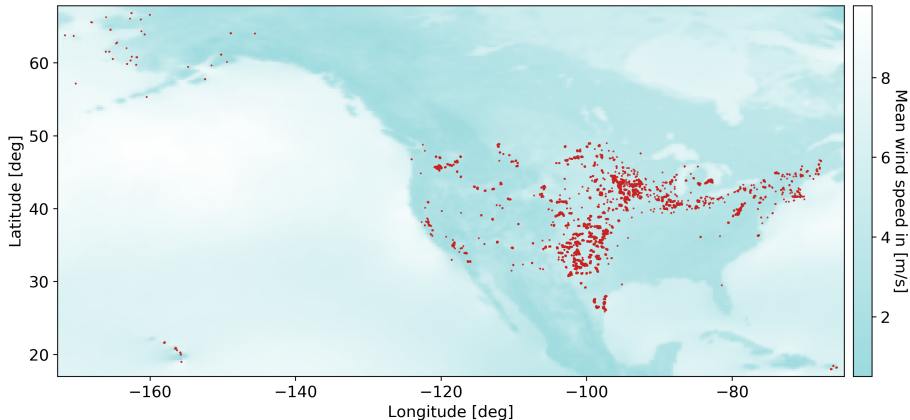
# Aim of course

Learn to use programming as a tool in research

- ▶ Version control your code with Git and collaborate on Git(hub)
- ▶ Install Python, Python packages, and Jupyter notebook servers in Conda environments
- ▶ Start programming in python and understand flow features (loops and conditions) and functions
- ▶ Get an overview of the Python scientific ecosystem
- ▶ Use Python scientific stack packages (numpy, xarray)
- ▶ Use open (climate) data in your research projects
- ▶ Generate plots using matplotlib

## Example use cases

Possible homework/application of presented know-how:  
Mean wind speed and wind turbine locations in the US



# How the class works

- ▶ 1.5 hours of lecture
- ▶ 1.5 hours of practical exercises
- ▶ Homework in groups



# Dates

Date	Content
12.03.2020 13:00-16:15	Introduction
19.03.2020 13:00-16:15	Introduction to Git
26.03.2020 13:00-16:15	Installation of Python in Conda
02.04.2020 13:00-16:15	Start programming in Python
30.04.2020 13:00-16:15	Python scientific ecosystem
07.05.2020 13:00-16:15	Numpy and xarray, <b>Maybe skipped</b>
14.05.2020 13:00-16:15	Use open (climate) data
28.05.2020 13:00-16:15	Generate plots using matplotlib
04.06.2020 13:00-16:15	<b>Replacement date for 7th of May</b>

# Prerequisites

- ▶ You should feel very comfortable with your respective operating system (Windows, Linux, Mac OS)
- ▶ Ideally, you have some experience with using a command line / terminal
- ▶ In a perfect world, you have programmed before

# Grading scheme

- ▶ Organize in groups of 4 students
- ▶ Do homework together
- ▶ Be prepared to present homework individually ("Kreuzerübung")

# Resources

Slides, links and other material in this Github repository:  
<https://github.com/inwe-boku/lecture-scientific-computing>

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Where/whom to ask questions?

- ▶ In a new Github issue, do not write emails to us:  
<https://github.com/inwe-boku/lecture-scientific-computing/issues>
- ▶ Your fellow peers in your group
- ▶ Ask us during class

# First assignment (I)

Homework (due on 19th of March):

- ▶ register at github.com or any alternative GIT hoster (e.g. gitlab.com)
- ▶ install a GIT and gitk (see instructions (1) on next slide)
- ▶ click/browse quickly through links & tutorials (see on next slide)
- ▶ clone a repository, change a file and commit (see instructions (2) next slide)
- ▶ prepare one question about GIT and add it to the list:  
<https://yourpart.eu/p/lecture-scientific-computing>

# First assignment (II)

(1) Install GIT & gitk

## **Installation on Linux:**

on Debian based systems run the command:

```
sudo apt install git gitk
```

## **Installation on Windows:**

1. install notepad++ (<https://notepad-plus-plus.org/downloads/>)
2. install git for windows (<https://gitforwindows.org/>). During the installation procedure, choose notepad++ as your preferred editor.

## **Configure name and mail address:**

Run a terminal (windows: GIT bash) and run the command<sup>1</sup>:

```
git config --global user.name "My Name or Pseudonym"  
git config --global user.email my-public-mailadress@example.com
```

---

<sup>1</sup>See also <https://git-scm.com/book/en/v2/Getting-Started-First-Time-Git-Setup>

# First assignment (III)

(2) Clone the lecture repository and add a commit

Run a terminal (windows: GIT bash) and run the command:

```
git clone https://github.com/inwe-boku/lecture-scientific-computing
```

Then change a file of your choice and run:

```
git add <file-name-of-the-file-you-changed>  
git commit -m 'I changed a file'
```

Explain your change in the commit message and close the editor.

Run gitk to check your commit.



# First assignment (IV)

See also:

<https://guides.github.com/introduction/git-handbook/>

(especially the section "Example: Contribute to an existing repository")

More helpful resources about GIT can be found here:

<https://github.com/inwe-boku/lecture-scientific-computing/blob/master/lecture01-git-version-control/links.rst>

# First assignment (V)

Warning: you will need to push your homework to a public Github repository. Your Github account is your business card for programmers – your homework will be part of it. You can create a separate Github account only for this course to be anonymous or your group deletes the repository after the semester, if you don't want your homework to remain public. Note: the name and mail address chosen during the GIT installation will be public too.