

Dear students,

In week 3 of the Digital Twinning course, we are going to teach you the following subjects:

Week 2.3 (48)	Monday (27 November 2023)	Tuesday (28 November 2023)
09:45 – 10:30	(OL)L: Pirouz (3D Modelling) Rudiments of Linear Algebra and Computer Geometry	(OL)L: Pirouz (3D Modelling) Rudiments of Computational Geometry & Topology
11:00 – 12:30	(OL)L: Pirouz (basics of Python for 3D modelling)	(OL)L: Pirouz (3D Visibility Analysis)
13:30 – 16:00	SP: Pirouz & Ivan- 3D modelling - practical	SP: Pirouz & Ivan- 3D modelling - practical
16:30 – 17:30	T-unsupervised tutorial: Pirouz Nourian & Ivan Cardenas	T-unsupervised tutorial: Pirouz Nourian & Ivan Cardenas

Please note that we will be starting the class an hour later than usual and that means that we will be closing also an hour later than usual.

We will be covering a wide range of mathematical concepts and helping you get started with computer programming for 3D modelling and 3D spatial analysis (particularly visibility studies). To save time for Q&A in the classroom, we would like to ask you to install a couple of things and read and watch a few lessons before attending:

Rhino3D: <https://www.rhino3d.com/download/> (you can get a free copy for 90 days and later you can get an educational license for 195 bucks if you want to continue using it in your thesis project)

MiniConda: <https://docs.conda.io/projects/miniconda/en/latest/> (choose to add Python to PATH while installing)

VSCode: <https://code.visualstudio.com/> (check the installation guide Pythonics0 for the extensions)

Here are some lecture notes that I would like you to read before attending the lectures:

[Basics of Linear Algebra for 3D Modelling \(video\)](#)

[Basics of Computational Geometry & Topology \(video\)](#)

[Basics of 3D Visibility Analysis \(video\)](#)

[Basics of Point Cloud Processing](#)

Getting started with Python programming in Rhino3D:

[Pythonics0: VSCode, Conda, Python, Basics](#)

[Pythonics1: Using a Geometric Computing Library](#)

[Pythonics2: Voxelization of a Boundary Representation](#)

[Pythonics3: Making a Spiral Stairway Procedurally](#)

You can also take a look at our repository for the practical sessions:

[https://github.com/Generative-Systems-Sciences/Enschede\\_3dWorkbench](https://github.com/Generative-Systems-Sciences/Enschede_3dWorkbench)

Best regards,

[Pirouz](#), also on behalf of [Ivan](#)