

Lesson 00
Overview course, marking, etc

GE01015.2024

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Who are you?

Digital terrain models (DTMs) are computer representations of the elevation of a given area, and they play an important role in understanding and analysing our built environment.

They are the necessary input for several applications (eg flood modelling, visibility, effects of climate change on the north poles, etc.), and they are also relevant for studying for seabed and other planets.

The course provides an overview of the fundamentals of digital terrain modelling (DTM):

- different representations of terrains: TINs, rasters, point clouds, contour lines
- reconstruction of terrains from different sources (LiDAR, photogrammetry, InSAR)
- spatial interpolation methods
- conversion between different terrain representations
- processing of terrains: outlier detection, filtering, segmentation, and identification and classification of objects
- applications, eg runoff modelling, watershed computations, visibility
- techniques to handle and process massive datasets

The course has both a theoretical part and a practical part where students reconstruct, manipulate, process, and extract information from terrains.

All the labs are programming tasks (to be done with Python and C++), and other open-source libraries and software are used.

Prerequisites

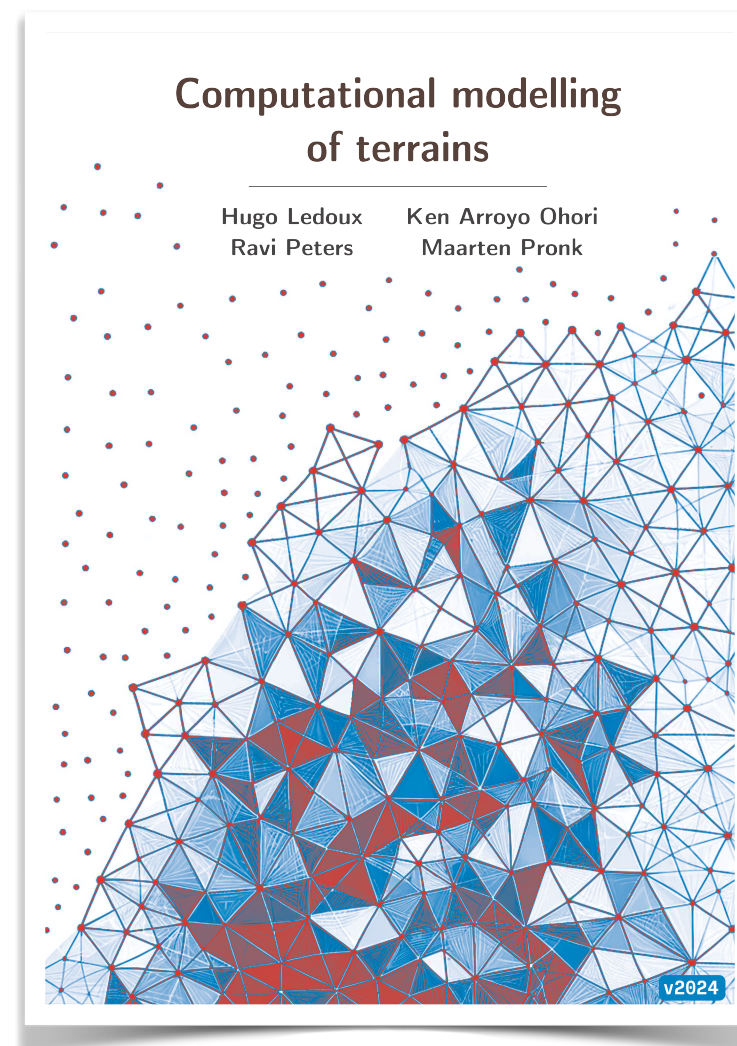
- GE01000 (but any coding experience should be fine)
- GE01001
- GE01002

Study goals

- describe the characteristics of elevations datasets from different sources (LiDAR, photogrammetry, InSAR)
- describe the pros and cons of different representations of terrains, and compare them for different applications
- explain how elevation datasets can be automatically converted to terrains
- reconstruct and manipulate terrains using with open-source libraries
- explain, analyse, and discuss how terrains can be useful in different applications related to built environment
- given a specific problem where elevation plays a role (eg visibility or flood modelling), analyse and identify which data and algorithms are needed to solve the problem, and assess the consequences of these choices;

Education methods

- **Flipped classroom:** each week there are 2 main topics, and students first watch the videos and read the material at home.
- Then there are 2x2h sessions (contact hours), the most difficult parts are discussed and students get help/support for the practicals.



+  YouTube

+  python™


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Contact hours

- Mondays 15:45-17:30 (help coding/assignments with SA; in the GeoLab (BG.0ost.630))
- Wednesdays 8:45-10:30 (contact hours)
- Fridays 8:45-10:30 (contact hours)
- presence not mandatory (except at the mid-term quiz on 2024-12-11@8:45-9:30)
- we're here to help; no new material will be introduced
- but we will explain and discuss key concepts that seem misunderstood and will demonstrate software, give tips, and answer questions

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Material used

- we provide our (free and open) book in PDF
- You need version v2024.0
- I suggest you group to print it in bulk, it's cheaper
 - BK Prints shop at the faculty can do that
- all the videos, papers, and chapters are available on the course website

We wrote the book ourselves and we would greatly appreciate your help:
please report errors, typos, and suggestions for improvement at:

<https://github.com/tudelft3d/terrainbook/issues>



Marking

- a total of 57.5% or above is necessary to successfully pass the course
- a minimum of 50% for the combined exams (quiz + final) is necessary (weighted-average of the two)
- there is one resit for the combined exams (thus one exam worth 60% during the resit period (Q3))
- there is one “resit” for all the three assignments together (during Q3), doing the resit for the assignments means you do them all. The resits are different from the original ones!
- you can choose which of the 2 types of resits you want to do:
 - ➔ (option 1) only the resit exam (60% of final mark);
 - ➔ (option 2) only the resit for the 3 assignments (40% of final marks, individual task);
 - ➔ (option 3) both option 1 and option 2.
- if you still fail after the resits (<57.5% or <50% for exam part), then you have to redo the whole course the following year.

Marking

type	weight
final exam	50%
mid-term quiz	10%
3 individual assignments	40%

Two exams

1. **mid-term quiz** (10%) 2024-12-11@8:45–9:30 in room BK-B
2. **final exam** (50%) on 2025-01-31@9:00-11:00 in room ???

Both exams are:

- **in-person**
- **open-book:** you can bring any (paper) books and/or paper notes you want (including past exams), but electronic devices are not allowed (except a simple calculator)

Homework

number	title	language	type	deadline	marks
00	Basic setup and knowledge for the course				--
01	Tanaka contours	Python	individual	2024-11-28@18:00	10%
02	Constructing DTMs from AHN4	Python	individual	2024-12-17@18:00	15%
03	Plane extraction with RANSAC	Python or C++	group	2025-01-17@18:00	15%

Brightspace is not used

- => <https://3d.bk.tudelft.nl/courses/geo1015/>
-  Discord “Geomatics server” — #geo1015-2024
- all announcements will be posted at <https://3d.bk.tudelft.nl/courses/geo1015/news/>
- questions? do ***not*** email us, we won't answer (!)
- we will “pin” relevant questions/answers in discord, and discuss in class the questions/answers we see many are struggling with

You are ill and cough and sneeze? Stay home!

If you are ill, do not come to BK-City.

Email me and I'll record the lecture.

Exam day? We will arrange something, no worries.



<https://3d.bk.tudelft.nl/courses/geo1015/>