Lesson 00
Overview course, marking, etc

GEO1015.2022

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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.

- GEO1000 (but any coding experience should be fine)

- GEO1001

- GEO1002

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;

- **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.

Contact hours

- Wednesdays   8:45–10:30

- Fridays   8:45–10:30

- Mondays   15:45-17:30 (help coding/assignments in the GeoLab (02.Oost.600))

- presence not mandatory (except at the mid-term quiz on 2022-12-09@8:45-9:15)

- 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, and give tips

⚠ not in the official timetable

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- we provide our (free and open) book in PDF

- get version 0.9.0

- all the videos, papers, 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

Computational modelling of terrains

Hugo Ledoux   Ken Arroyo Ohori
Ravi Peters   Maarten Pronk

v0.9

type	weight
final exam	50%
mid-term quiz	5%
3 individual assignments	27%
1 group assignment	18%

Important rules:

- a total of 57.5% or above is necessary to successfully pass the course;

- there are 2 exams: one mid-term quiz and one final exam;

- a minimum of 50% for the combined exams (quiz + final) is necessary;

- there is *one* resit for the combined exams (thus one exam worth 55% during the resit period (Q3));

- there is *one* "resit" for all the four assignments, if you failed some parts you need to do the do the four resit assignments (different from the original ones!);

- if you still fail after the resits, then you have to redo the whole course the following year.

1. **mid-term quiz** (5%) 2022-12-09@8:45-9:15 in room BK-B

2. **final exam** (50%) on 2023-02-03@9:00-12:00 in room ???

Both exams are:

- **in-person** (unless this changes because of corona)

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

number	title	language	type	deadline	marks
00	Basic setup and knowledge for the course				--
01	Spatial interpolation	Python or C++	individual	2022-11-29 17:00	9%
02	Does the sun shine there?	Python or C++	individual	2022-12-08 17:00	9%
03	Kriging interpolation	Python	individual	2022-12-20 17:00	9%
04	Processing point clouds	Python or C++	group of 2-3	2023-01-23 17:00	18%

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

- 🎮 Discord "Geomatics server" — #geo1015-2022

- 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
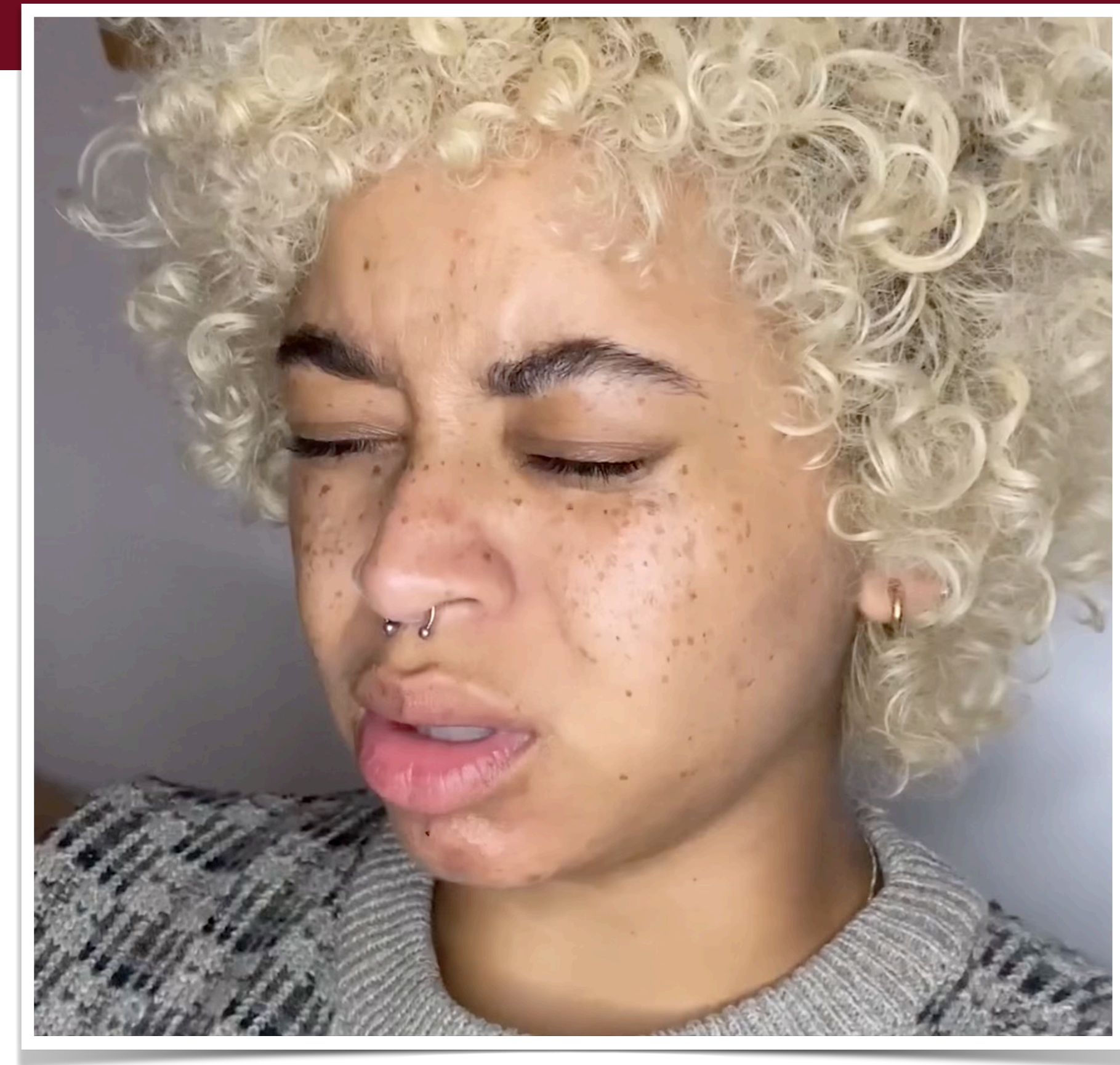
If you have any symptoms do <u>not</u> come to BK-City.

Email me and I'll record the lecture.

Exam day? We will arrange something, no worries.

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