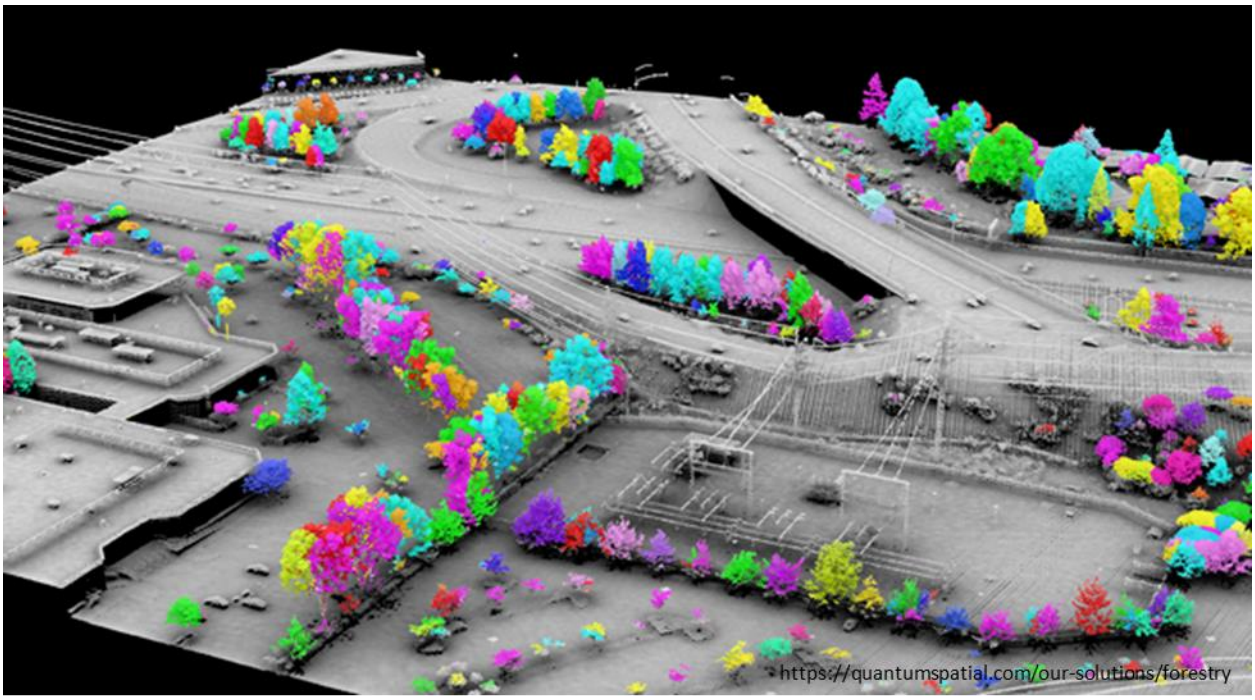
LA 4/559 Fall 2021

3D Mapping with LiDAR

CRN 13643/ 13663 - ASYNC WEB (2 units tech course)

Instructor: **Dr. Junhak Lee**, junhakl@uoregon.edu



LiDAR (Light Detection and Ranging) is a cutting-edge remote sensing technology that uses laser pulses to determine a distance between the sensor and a surface or object. Recently, LiDAR has become an inevitable source to generate 3D elevation and terrain models with very high accuracy for both natural and built environments. The course will introduce students the basic principles of LiDAR, LiDAR sensors, platforms, data collections, data processing, and analysis. Students will learn basic knowledge and practical skills to use LiDAR data sources and extract intended information in various applications, including topographic mapping, vegetation analysis, and 3D modeling of urban infrastructure.

Course Objectives

The students will be able to:

- Describe the basic operational characteristics of lidar instruments and platforms
- Visualize LiDAR data in 2D and 3D
- Extract spatially explicit 3D information from LiDAR datasets
- Understand limitations and sources of errors of LiDAR
- Extend the learned skills and knowledge to solve real-world problems

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Textbook

- No textbook is required

Software

- Windows OS (to run ArcGIS)
  - If you have a Mac, you need to have a Windows OS on your Mac using either Bootcamp or virtualization software (such as VMWare, Parallels, VirtualBox, etc)
- ESRI ArcGIS
  - If you want to install the ArcGIS program on your computer, you can request a license code (1-yr academic use) to the instructor (with NO cost)
  - You can use ArcGIS at libraries and labs on campus
- Sketchup Make (free-of-charge version)
- R (R is a language and environment for statistical computing and graphics) – optional
- CloudCompare (3D point cloud and mesh processing software - free)

Course Mechanics

Although this course is online (on Canvas) and proceeded asynchronously (i.e. students can access class materials and conduct lab exercises anytime with their own time schedule), the class activities and assignments (video lectures, readings, quizzes, and lab exercises) will be released a weekly basis (with weekly due dates). Hence, course workloads are evenly distributed throughout the term. The weekly hands-on exercises mainly based on the textbook and cover various applications, including topography analysis, visibility analysis, sea-level rise, solar potential estimation, shoreline analysis, and vegetation analysis.

In addition to online assistance, the instructor will be available during office hours to work one-on-one with students wishing in-person assistance.