GEOG 4570 – Special Topics in GIS: LiDAR Applications

Fall 2019. Monday 6:00 – 8:50 PM, ENV 336

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Office Hours: Mon 5:00 – 6:00 PM, Thu 5:00 – 6:00 PM, or by appointment.

Prerequisites: Consent of department.

Objectives

Light detection and ranging (LiDAR) has been widely used to solve problems in the natural and built environments. This course introduces LiDAR principles, data processing methods, and applications in forestry, urban environments, and geosciences. It includes lectures, demos, hands-on exercises, Esri tutorials, and a course project. It is for those who have worked with vector and raster data using Esri's ArcGIS. Students will develop skills to effectively use LiDAR data in a geographic information system environment for solving real world problems.

Textbook: *LiDAR Remote Sensing and Applications*, CRC Press/Taylor & Francis Group, 200 pages. Authors: Pinliang Dong and Qi Chen (2018). ISBN: 9781138747241, or 9781482243017.

Software: ArcGIS Desktop 10.7, with 3D Analyst, ArcScan, and Spatial Analyst.

In-Class Exercises

After the lecture session, students will work on hands-on projects, Esri tutorials, or the course project. A total of 11 hands-on projects will be provided. Results of the hands-on projects should be submitted to Canvas. The instructor will check your hands-on projects every Tuesday. If you miss a class, you should contact the instructor and finish the hands-on project by the following Tuesday. Late submission will be marked down 10% each day.

Esri E-Learning Courses

Students will complete the following two Esri E-Learning courses. Certificates of the E-Learning courses should be submitted to Canvas. More instructions on the E-Learning courses will be provided in class. **Note**: Students who have not taken "GEOG 4550 Advanced GIS" should complete a module on "Basics of Raster Data" by **September 22**.

1. Managing Lidar Data Using LAS Datasets (this course requires ArcGIS 10.6 or 10.7). (*2 hours 30 min*)
2. Managing Lidar Data Using Terrain Datasets. (*4 hours 45 min*)

Course Project

Each student will complete an individual course project involving LiDAR data. Students should discuss project ideas with the instructor, identify a proper project topic, find LiDAR data for the project, and complete the project by the final week. The course project can be on LiDAR data processing and analysis methods, or any application of LiDAR. Each student will give an 8-minute presentation, and submit a course project report of 4 – 6 single-spaced pages (including tables, figures, and references). The course project report should be submitted to Canvas.

Schedule

Week	Date	Topic
1	Aug 26	Course Introduction and Remote Sensing Overview *Demos and In-Class Exercises*
2	Sept 2	Labor Day (no class)
3	Sept 9	Review of Vector and Raster Data Processing in ArcGIS *Project 2.1 and Esri E-Learning Course 1*
4	Sept 16	Principals of LiDAR *Project 2.2, Project 2.3, and Esri E-Learning Course 1*
5	Sept 23	LiDAR Data Processing (1) *Project 3.1 and Esri E-Learning Course 2*
6	Sept 30	LiDAR Data Processing (2) *Project 3.2 and Esri E-Learning Course 2*
7	Oct 7	Vegetation Mapping and Measurement Using LiDAR (1) *Project 4.1 and Esri E-Learning Course 2*
8	Oct 14	Vegetation Mapping and Measurement Using LiDAR (2) *Project 4.2 and Esri E-Learning Course 2*
9	Oct 21	Urban Applications of LiDAR (1) *Project 5.1 and Course Project*
10	Oct 28	Urban Applications of LiDAR (2) *Project 5.2 and Course Project*
11	Nov 4	Earth Science Applications of LiDAR (1) *Project 6.1 and Course Project*
12	Nov 11	Earth Science Applications of LiDAR (2) *Project 6.2 and Course Project*
13	Nov 18	Course Project Week (work on your course project)
14	Nov 25	Course Project Presentations (1)
15	Dec 2	Course Project Presentations (2)
16	Dec 9	**Course Project Report Due**

Grading Structure

Class Attendance	12%
In-Class Projects	22%
Two Esri E-Learning Courses (15% each)	30%
Course Project Presentation	10%
Course Project Report	26%
Total	**100%**
90-100: A; 80-89: B; 70-79: C; 60-69: D; 0-59: F. A minimum grade of "B" is required for the GIS Certificate.	

Extra Credit

The Department of Geography does not allow extra credit assignments (work not specified on a course syllabus).

Academic Dishonesty

Students caught cheating or plagiarizing will receive a "0" for that particular assignment or exam. Additionally, the incident will be reported to the Office of Student Rights and Responsibilities for further penalty. According to the UNT catalog, the term "cheating" includes, but is not limited to:

a. Use of any unauthorized assistance in taking quizzes, tests, or examinations;
b. Dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;
c. The acquisition, without permission, of tests or other academic material belonging to a faculty or staff member of the university;
d. Dual submission of a paper or project, or resubmission of a paper or project to a different class without express permission from the instructor(s); or
e. Any other act designed to give a student an unfair advantage.

The term "plagiarism" includes, but is not limited to:

a. The knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment; and
b. The knowing or negligent unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

Accommodations

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda. You may also contact them by phone at 940.565.4323.

Classroom Courtesy

Please follow these guidelines to avoid disrupting the class:
(1) Turn off cell phones before arriving.
(2) Do not arrive late or leave early (except for a bathroom break or emergency).
(3) Do not sleep or eat during class.
(4) Do not work on other assignments during class.
(5) Do not talk when the instructor is lecturing, unless prompted for feedback by the instructor.

Course Evaluation

You will receive an email with a link to the UNT Student Perceptions of Teaching (SPOT) Course Evaluation by the end of the semester.