Lakehead UNIVERSITY

GEOG 4211 Advanced GIS And Spatial Analysis
Winter 2023 January 9 - April 11

Instructor: TBD
Email: TBA
Class Hours: TTh 2:30PM - 3:30PM through ZOOM
Office Hours: TBA

Lab Instructor: TBD
Email: TBA
Class Hours: F 10:30AM - 12:30PM through ZOOM
Office Hours: TBA

Course Description:

Advanced GIS and Spatial Analysis is an advanced course in Geographic Information Systems (GIS) and spatial analysis applications. The first part of the course will introduce advanced spatial analysis techniques such as spatial interpolation, watershed analysis, spatial pattern analysis and network analysis. Students have an opportunity to apply acquired skills to three real-world applications. A range of data sources and GIS methods, including spatial analysis of some kind, will include each application. Students will develop GIS skills and project management and presentation skills by completing steps required to take a GIS project from the initial step to final map production and presentation.

Learning Outcomes:

Upon successful completion of this course, students will be able to:
- ✓ understand advanced spatial analysis techniques: spatial interpolation, network analysis, spatial statistics etc.;
- ✓ identify key concepts related to GIS/Remote Sensing and explore how to apply them to solve real-world problems;
- ✓ formulate research objectives and research questions, and search for background information;
- ✓ identify required data sources, design data preparation and advanced techniques in order to achieve a geospatial solution;
- ✓ effectively work independently or as a group to fulfil project requirements and to meet deadlines; and

✓ develop perspectives on GIS, including the pros and cons, as both a decision support technology and a research tool.

Pre-requisites:

GEOG 2232, GEOG 2215 and GEOG 4231

Teaching and Learning approach:

The course will include a mix of theory, discussion, demonstration, guided application, and independent lab time.

Learning Resources:

Recommended: Chang, Kang-tsung. 2019. Introduction to Geographic Information Systems (9th edition). McGraw Hill Education.

Available for a 6 month rental period:
https://www.mheducation.com/highered/product/introduction-geographic-information-systems-chang/M9781259929649.html

Assessment:

Task 1: Lab exercises ………………………………………	40%
Task 2: Term project 1…………………………….. ………	20%
Task 3: Term project 1…………………………….. ………	20%
Task 4: Term project 1…………………………….. ………	20%

Course Expectations/Student Responsibilities:

1. **Attendance** is expected for each lecture and lab including individual lab time unless communicated with the instructor ahead of time.
2. **Late Assignments** receive a deduction of 10% per day unless an extension is agreed to with the instructor prior to the due date.
3. **Participation** is expected in all class discussions, group work and collaborative efforts.
4. **Exams - t**his is mainly a project-based course and no exams are designed. However, students must pass the term project to be successful in the course.

Course Schedule:

Week starting from	Lab exercise	Lecture	Lecture
Week 1	**Course introduction** **Lab 1:** Introduction to ArcGIS Pro (estimate solar power potential)	Raster data analysis	Raster data analysis and Terrain Mapping
Week 2	**Lab 2:** Spatial interpolation in ArcGIS Pro	Spatial interpolation	Viewshed and Watershed analysis
Week 3	**Lab 2 Cont.:** Watershed analysis	*Introduction to Term Project 1 (group of two students)*	*Term project 1*
Week 4	*Term project 1*	*Term project 1*	Spatial statistics (pattern, cluster/outlier)
Week 5	**Lab 3:** Spatial pattern analysis	*Term project 1 presentations*	Spatial statistics – hot spot analysis and heat maps
Week 6	**Lab 3 Cont.:** Hot spot analysis	Spatial regression	Spatial regression
Week 7	*Study break*		
Week 8	**Lab 3 Cont.:** Modelling spatial relationships	Spatial statistics – modelling spatial relationships	*Introduction to term project 2 (group of two students)*
Week 9	*Term project 2*	*Term project 2*	*Term project 2*
Week 10	*Term project 2*	Network Analysis	*Term project 2 presentations*
Week 11	**Lab 4:** Network Analysis	Network Analysis	*Introduction to term project 3 (group of two students)*
Week 12	**Lab 4 Cont.:** Network Analysis	*Term project 3*	*Term project 3*
Week 13	*Term project 3*	*Term project 3*	*Term project 3 presentations*

Note that this document is subject to change pending unforeseen circumstances.