**GEOM 2008: Raster GIS: Pixels and Grids**
**Winter 2023**

**Department of Geography and Environmental Studies - Carleton University**

**Instructor:** Niloofar Alavi
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*Please include the course code ("GEOM2008") in the subject line.
**Office hours:** Mondays and Tuesdays by appointment

**TA:** Jason Beaver
**Email**: jasonbeaver@cmail.carleton.ca

**Lecture:** Mondays 11:35 - 13:25

**Laboratory:**
**A1:** Tuesdays: 11:35 - 13:25
**A2:** Wednesdays 11:35 - 13:25

## I. Course Description

Storage, visualization, manipulation, and analysis of gridded geospatial data; 3D raster visualization; digital terrain analysis; interpolation and filtering; raster geoprocessing and projections; selected topics in raster GIS such as least-cost path analysis, natural hazard assessment, pollution mapping, and hotspot analysis. This course will introduce the raster GIS data format and analysis techniques. Labs will be completed in ArcGIS Pro.

Prerequisite(s): GEOM 1004 or permission of the Department.

## II. Learning Outcomes

By the end of this course students will:

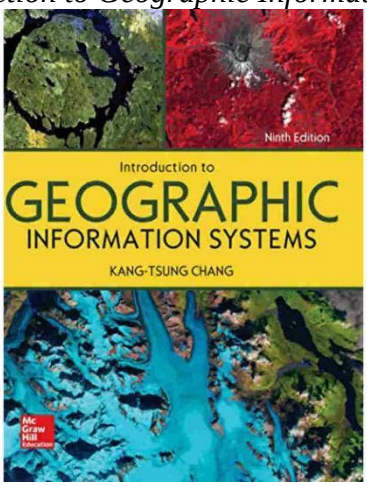
- Understand the theory and application of raster GIS data structures including concepts and techniques related to raster analysis and querying);
- Possess the foundational knowledge and skills required for intermediate raster manipulation, including site suitability analysis using appropriate raster geoprocessing tools and least-cost path analysis;
- Understand the types of problems that can be solved using raster-GIS analysis and be proficient with designing and implementing raster-based GIS problem solving workflows for spatial support for decision-making; and

- Be proficient with several different GIS software tools for manipulating, analyzing and mapping data using rasters and their attributes for intermediate geospatial analysis.

## III. Required Reading

This course uses a mandatory textbook, available through the Carleton University Bookstore (below). Required textbook readings and other resources will be posted on Brightspace on a weekly basis.

Kang-Tsung Chang – *ISE Introduction to Geographic Information Systems, 9e*




## IV. Evaluation

- 5 Labs (variable weighting) = 40%
- Final exam = 20%
- Final project = 40%

Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

**Late Policy:** All assignments must be submitted through Brightspace by the due date and time. No late assignments will be accepted, with exception of cases where a student is sick or has already arranged for academic accommodation as described in subsequent sections of this syllabus. In the case of illness, you must make arrangements with the course instructor **prior** to the due date/time. In place of a doctor's note or medical certificate, students are advised to complete the self-declaration form available on the Registrar's Office website to request academic accommodation for missed coursework including exams and assignments.

**Lecture/Lab attendance:** Lectures will cover theoretical components of remote sensing and may also include software demonstrations. Labs will include software demonstrations and one-on-one help will be available for software and practical related questions.

**Final exam (20%)** is based primarily on the textbook readings and will be taken on April 3rd.

**Final project (40%)** will be explained in class and made available on Brightspace.

## V. Course calendar

**Tentative: dates and topics subject to change. Updates will be posted to the course Brightspace**

| Week | Lecture | Readings for lectures | Lab |
|---|---|---|---|
| Jan 9 | Welcome + Introduction to Gridded Geospatial Data | Chapter 2 and 4 | Lab introduction<br>Lab Assignment 1 |
| Jan 16 | GIS Library presentation + Projections and Coordinate Systems | Chapter 2 and 4 | Lab Assignment 1 due, Lab Assignment 2 |
| Jan 23 | Raster Analysis Techniques 1 | Chapter 12 and 13 | Work period (Lab Assignment 2) |
| Jan 30 | Raster Analysis Techniques 2 | Chapter 12 and 13 | Work period (Lab Assignment 2) |
| Feb 6 | Interpolation | Chapter 15 | Lab Assignment 2 due, Lab Assignment 3 |
| Feb 13 | Least-Cost Path Analysis | Ch 17 up to and including 17.2 (pg 384) | Work period (Lab Assignment 3) |
| Feb 20 | Winter Break | | |
| Feb 27 | Guest lecturer-TBD | | Lab Assignment 3 due, Lab Assignment 4 |
| Mar 6 | Guest lecturer-TBD | | Work period (Lab Assignment 4)<br>Final project proposal due |
| Mar 13 | Site Suitability Assessment | Chapter 18 | Lab Assignment 4 due, Lab Assignment 5 |
| Mar 20 | Introduction to working with imagery | | Work period (Lab Assignment 5) |
| Mar 27 | Guest lecturer-TBD | | Work period (Lab Assignment 5) |
| Apr 3 | Final exam | | Lab Assignment 5 due |
| Apr 27 | Final project due | | |

## VI. Other important course information

**Required Computer Software**

During this course you will make use of the following specialized software:

ArcGIS Pro v2.8 or higher for PC only (student license available)

For more information about computing requirements to run ArcGIS Pro please visit:
https://www.carleton.ca/geography/computing-requirements-for-dges-courses/

For students using macOS, please refer to the note in the above link that pertains to you. Briefly, ArcGIS Pro only runs on the Windows platform, and you will need to install a Windows partition on your computer, or use Windows VM access with the installed software (instructions will be posted on Brightspace).

## VII. Statement on Plagiarism

**PLAGIARISM**

The University Senate defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This can include:

- reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another's data or research findings; and
- failing to acknowledge sources through the use of proper citations when using another's works and/or failing to use quotation marks.

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.

## VIII. Requests for Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation**
Write to the instructor directly with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

**Religious obligation**
Write to the instructor directly with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

**Academic Accommodations for Students with Disabilities**
The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two

weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made.

Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

**Survivors of Sexual Violence**

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/equity/sexual-assault-support-services

**Accommodation for Student Activities**

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf