ORIGINAL COURSE IMPLEMENTATION DATE: September 2006
REVISED COURSE IMPLEMENTATION DATE: September 2017
COURSE TO BE REVIEWED: (six years after UEC approval) January 2016
Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: GEOG 353	**Number of Credits:** 4 Course credit policy (105)
Course Full Title: GIS Applications **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Social Sciences	**Department (or program if no department):** Geography and the Environment

Calendar Description:

This course focuses on the use of Geographic Information Science in problem-solving and decision-making in real world settings. Designed to complement GEOG 253, Introduction to GIS, students will be introduced to additional GIScience techniques and how to use them in a variety of applications.

Prerequisites (or NONE):	GEOG 253. Recommended: a 100-level COMP course and GEOG 252.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Equivalent Courses (cannot be taken for additional credit)
Former course code/number:
Cross-listed with:
Equivalent course(s):
Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit
Transfer credit already exists: ☐ Yes ☒ No
Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☒ No (if yes, fill in transfer credit form)
Resubmit revised outline for articulation: ☐ Yes ☒ No
To find out how this course transfers, see **bctransferguide.ca**.

Total Hours: 90
Typical structure of instructional hours:

Lecture hours	20
Seminars/tutorials/workshops	
Laboratory hours	55
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	15
Other contact hours:	
Total	**90**

Special Topics
Will the course be offered with different topics?
☐ Yes ☒ No
If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit
Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 25

Expected frequency of course offerings (every semester, annually, every other year, etc.): once every year

Department / Program Head or Director: Steven Marsh	**Date approved:**	December 2016
Faculty Council approval	**Date approved:**	January 2017
Campus-Wide Consultation (CWC)	**Date of posting:**	March 17, 2017
Dean/Associate VP: Dr. Jacqueline Nolte	**Date approved:**	January 2017
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	March 24, 2017

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Demonstrate an additional foundation GIS concepts and skills beyond those introduced in GEOG 253.
2. Apply basic and intermediate GIScience spatial analysis techniques to problems in Geography and other disciplines.
3. Negotiate and debate the issues and concerns that influence the successful implementation of a GIS project.
4. Identify and research the spatial issues surrounding a chosen problem that can be addressed with GIS, formulate a workflow to address the problem, and document the procedures and projected outcomes.
5. Demonstrate an acquaintance with the scope of GIS and GIScience throughout modern society.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

The course will be offered in a lecture/lab format with an online learning component.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☒

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Chang, Kang-tsung	Introduction to geographic information systems, 8th ed.	☐	McGraw-Hill	2016
2.	Law, M and Collins, A	Getting to Know ArcGIS. 4th Edition	☐	Esri Press	2015
3.	Longely PA, Goodchild, MF, Maguire, DJ, and Rhind, DW	Geographic Information Science and Systems, 4th ed.	☐	Wiley	2015

Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)

None

Typical Evaluation Methods and Weighting

Final exam:	%	Assignments:	25%	Midterm exam:	%	Practicum:	%
Quizzes/tests:	35%	Lab work:	40%	Field experience:	%	Total:	100%

Typical Course Content and Topics

1. *Intro GIS concepts review.* Key concepts in theory and practice from GEOG 253 are reveiwed, including data models, coordinate systems, GIS database management, spatial analysis, and geoprocessing *Lab 1- Vector data analysis and query to analyze census distributions*.
2. *Raster Data Analysis*. Raster data analysis is compared and contrasted to vector data analysis. Local, neighborhood, zonal, physical distance, and map algebra raster analysis methods are introduced and discussed in terms of problem solving, such as site selection, soil erosion modeling, and habitat models. *Lab 2: Intro to Raster data Analysis:* A range of raster data operations are introduced to convert cell values, calculate precipitation within watersheds, and locate the potential habitat of a plant species.
3. *Terrain Mapping and Analysis.* Methods of working with digital elevation models are introduced, including hillshades, contours, slope, aspect and surface curvature. *Lab 3 - Intro to Terrain Analysis:* A elevation data layer from British Columbia is used to create and analyze hillshades, contour lines, slope, aspect, and curvature layers.,
4. *Viewsheds and Watersheds.* The concept of viewsheds is introduced using examples such as visual impact of windfarms and visibility of funerary mounds in ancient societies. Applications of watersheds as ecological and management boundaries are studied, using British Columbia examples. *Lab 4 – Viewsheds and Watersheds: Methods for creating and manipulating viewsheds and watersheds using GIS are explored using a local elevation dataset.*
5. *Raster Path Analysis.* Raster based techniques for modeling paths across different types of landscapes are studied. Examples include wildlife corridors, fire access routes across rugged terrain, and transportation routes that minimize environmental impact. *Lab 5 - Least Cost Path Analysis:* The shortest paths to a mountaintop location from different starting points are derived.
6. *Spatial Interpolation.* Methods to create continuous statistical surfaces using spatial interpolation methods from point datasets are introduced using examples of general terrain trends, density of animal sightings, and crime intensities. *Lab 6- Spatial Interpolation:* Precipitation trends across British Columbia are analyszed using spatial interpolation methods.
7. *Spatial Data Analysis .* Concepts of spatial analysis and spatial statistics are studied with a focus on understanding the nature of patterns, using examples of vegetation distributions, wildlife habitat, disease spread, and crime patterns. *Lab 7 - Spatial statisics:* Population distributions in Los Angeles County are mapped and analyzed using a range of spatial statistics.
8. *Intro to GIS Modeling,* Spatially explicit models are introduced and compared to non-spatial modles. Examples include ecological ranking of forest lands, groundwater nitrate concentrations, and soil erosion modeling. *Lab 8 – GIS modeling:* Raster and vector binary models of plant species habitat are created and compared.
9. *Remote Sensing and GIS.* Methods of integrating remote sensing and GIS technologies are explored for data gathering, mapping, and analysis. Examples include forest management, urban asset management, urban change mapping, and emergency planning and disaster management. *Lab 9 – Remote Sensing and GIS:* Examing land cover change in the Fraser Valley
10. *Thinking Geographically with GIS.* Planning a geographic inquiry with a focus on GIS is discussed in terms of asking questions, acquiring resources, analyzing information, and acting on knowledge. Examples of forest health, water supplies, and impacts of resource extraction are used. *Lab 10 – Housing Site Selection: Developing a work flow for a housing development that minimizes environmental impact.*