GEOSCIENCES (GEO) 1720/3720: GEOSPATIAL ANALYSIS
SPRING SEMESTER 2020

NOTE: Dual-listed courses: Lower-division (blue) and upper division courses (green) are color-coded to indicate unique information related to each course.

Meeting Time:	TO BE DETERMINED
Location	TO BE DETERMINED
Instructor:	Michael W Hernandez, Ph.D. Department of Geosciences
Phone #:	(801) 626-8186
Office:	TY 334
Communication:	**WSUOnline – Canvas messaging system (preferred)** mhernandez@weber.edu (alternate)
Office Hours:	TO BE DETERMINED OR by appointment

REQUIRED MATERIALS

- Weber State University Custom Spiral-bound hardcopy of both texts under ISBN: 9781307254563 ($145.00 for both texts)

Chang, Kang-tsung. (2019) *Introduction to Geographic Information Systems, 9th Edition.* New York: McGraw Hill.

Price, Maribeth, (2019) *Mastering ArcGIS,8th Edition*. New York: McGraw Hill.

ADDITIONAL MATERIAL

There will be additional readings assigned by the instructor throughout the semester.

COURSE DESCRIPTION & OBJECTIVES

- This advanced geospatial course presents geoprocessing techniques that support spatial analysis and modeling in both the vector and raster data models. The main goal of the course is to teach you the tools/methods that address spatial analysis / modeling applications used in a variety of professional fields that utilize geospatial information. After successful completion of this course, you will have the foundation necessary to become a Geospatial/GIS analyst or advanced GIS user with marketable skills required in the geospatial workforce today.

- *The specific objectives of the course are:*
  1) Identify and select suitable geoprocessing approaches to solve geospatial problems or answer questions using appropriate geospatial tools and methods.
  2) Execute geoprocessing tools individually and construct a model that runs several tools sequentially that transform data into information.
  3) Evaluate the results from geospatial analysis and modeling techniques.
  4) Demonstrate advanced geospatial analysis skills learned in the course by completing a final project. The project will include designing and

executing a geoprocessing approach that addresses a real-world issue/problem.

5) Present the results from the final project both as a professional 10-minute talk and online in the form of an ESRI Story Map.

STUDENT LEARNING OUTCOMES (SLOS)

By the end of the course, students are expected to:

1. Construct effective queries, joins, and spatial joins using GIS software that accurately address geospatial questions.
2. Understand, perform, and evaluate appropriate geoprocessing tools and spatial overlay analysis methods.
3. Understand and apply both utility and transportation network analysis approaches.
4. Understand, apply, analyze, and evaluate raster-based spatial analysis using Map Algebra.
5. Understand, apply, analyze, and evaluate specific raster-based spatial analysis techniques (e.g., surface/terrain, watersheds, spatial interpolation).
6. Understand, apply, analyze, evaluate, and create geospatial models using both raster and vector data.
7. Understand and apply remote sensing concepts in the context of imagery used in a GIS, such as finding, displaying, and enhancing satellite and airborne images to support spatial analysis.
8. Apply multiple concepts and software operations learned in SLOs 1 – 7 to solve a geospatial problem.

PREREQUISITE:

- GEO 1720: GEO 1710
- GEO 3720: GEO 3710

LAB FEES

- $50
- The fees in this course are used to purchase expendables such as printer paper and color printer cartridges used for student printing in the lab. The remaining funds are pooled with funds from other courses to help pay for nonexpendable items such as annual software license fees (e.g., ESRI ArcGIS, ENVI, Trimble, etc.) and replacement of computer workstations / other equipment.

COURSE POLICIES

Methods of Evaluation: Grades are based on overall performance, measured by the scores earned from **exams, lab exercises, and a final project** assigned during the semester. This course will use the standard +/- grade scale in accordance with university policy. Final grades will be awarded using the following percentage scale that is based on the total number of points earned divided by the total number of available points.

A	93.0+%	B-	79.0-81.9%	D+	66.0-68.9%
A-	89.0-92.9%	C+	76.0-78.9%	D	63.0-65.9%
B+	86.0-88.9%	C	72.0-75.9%	D-	60.0-62.9%
B	82.0-85.9%	C-	69.0-71.9%	E	<60.0%

1 Exam (20% of grade)
10 Labs (40% of grade)
1 Final Project (40%)

Upper Division Course Credit Requirements

This is a **dual-listed course** where lower division or upper division credit is earned with successful completion of the course, earning a grade of C or better. ***Students enrolled in the upper division section of the course will have additional requirements that demonstrate a higher level of learning*** on **labs** (e.g., *challenge problems*), **exams** (e.g., *essay questions*), and **the final project** (i.e., *different project with more comprehensive objectives*).

Methods of Instruction: Instruction may include, but not limited to, the following methods:

- Lecture / Discussion
- Learning Modules (online)
- Audio-Visual Material (e.g., online videos)
- Collaborative Learning
- Computer Assisted Instruction
- Lab Exercises

COURSE OUTLINE

Week	Date	UNITS	SLOs (number)	Labs Due
1		UNIT 1: Constructing and Executing Queries/Joins-Relates/Spatial Joins		
		Lab 1:		
2		UNIT 2: Geoprocessing Tools (e.g., clip, buffer) & Spatial Overlay Analysis		
		No Lab		Lab 1
3		Geoprocessing Tools & Spatial Overlay Analysis (cont'd)		
		Lab 2		---

4		UNIT 3: Network Analysis		
		Lab 3:		Lab 2
5		Network Analysis (cont'd)		
		Lab 4:		Lab 3
6		UNIT 4: Raster-based Spatial Analysis (Map Algebra)		
		No Lab		Lab 4
7		Raster-based Spatial Analysis (Map Algebra) cont'd		
		Lab 5:		---
8		UNIT 5: Raster-based Spatial Analysis (Specific Applications)		
		Lab 6:		Lab 5
9		Raster-based Spatial Analysis (Specific Applications) cont'd		
		Lab 7:		Lab 6
10		Raster-based Spatial Analysis (Specific Applications) cont'd		
		Lab 8:		Lab 7
11		UNIT 6: Geospatial Modeling		
		Lab 9:		Lab 8
12		UNIT 7: Remote Sensing: Using Imagery in GIS		
		Lab 10:		Lab 9
13		UNIT: 8: Final Project		
		Lab session: work on final project		Lab 10
14		Final Project (cont'd)		
		Lab session: work on final project		---
15		Final Project (cont'd) **EXAM**		
		Lab session: work on final project		Final Project

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