GEOG 4211 – ADVANCED GIS AND SPATIAL ANALYSIS

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Course Description:

Advanced GIS and Spatial Analysis is an advanced course in applications of Geographic Information Systems (GIS) and spatial analysis. 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 a spatial analysis of some kind will include to each application. Students will develop not only GIS skills but also project management and presentation skills by completing steps required to take a GIS project from 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. After class assignments are graded and returned, late assignments receive a zero grade **but must be satisfactorily completed to receive credit in the course.**
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. Students receiving a final mark less than 50 in a course must review their situation with the instructor within two weeks of receiving their marks to identify possible means of improving. The maximum mark the student can achieve through supplemental work is 60.

Course Schedule:

Week starting from	**Lecture** (Wednesday 11.30 to 12.30)	**Lab exercise** (Friday 8.30 to 10.30)	**Lecture** (Friday 11.30 to 12.30)
Jan 11	Course introduction, Raster data analysis	**Lab 1:** Introduction to ArcGIS Pro	Raster data analysis and Terrain Mapping
18	Spatial interpolation	**Lab 2:** Spatial interpolation in ArcGIS Pro	Viewshed and Watershed analysis
25	*Introduction to Term Project 1 (group of two students)*	**Lab 2 Cont.:** Watershed analysis	*Term project 1*
Feb 1	*Term project 1*	*Term project 1*	*Term project 1 presentations*
8	Spatial statistics (pattern, cluster/outlier)	**Lab 3:** Spatial pattern analysis	Spatial statistics – hot spot analysis and heat maps
15	***Reading break – no classes***		
22	Spatial regression	**Lab 3 Cont.**: Hot spot analysis	Spatial regression
Mar. 1	Spatial statistics – modelling spatial relationships	**Lab 3 Cont.**: Modelling spatial relationships	*Introduction to term project 2 (group of two students)*
8	*Term project 2*	*Term project 2*	*Term project 2*
15	Network Analysis	*Term project 2*	*Term project 2 presentations*
22	Network Analysis	**Lab 4:** Network Analysis	*Introduction to term project 3 (group of two students)*
29	*Term project 3*	**Lab 4 Cont.:** Network Analysis	*Term project 3*
Apr. 5	*Term project 3*	*Term project 3*	*Term project 3 presentations*

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