Geo475/Geo575 (Spring 2020)

GIS Data Science Project Management (Title)

Landscape Modeling with GIS (Subtitle)

Pre-Requisite for Geo475: Geo481; Pre-Requisite for Geo575: Geo506

Instructor: Chris S. Renschler (rensch@buffalo.edu)

Time schedule (3 credits): Mo We Fr 9:00 - 9:50 am (Wilkeson 144/145 (GIAL))

Optional schedule (if all students agree after add/drop): Mo We 8:30 - 9:50 am

Office Hours (Wilkeson 116)**:** Mondays 10-11 am and Wednesdays Noon-1 pm

Audience: Graduate Students in Geography, Data Science, Engineering, Planning, Geology, Environmental Science, Ecology, Economics, Health Sciences or permission by instructor.

Objectives: The lectures and computer lab exercises introduce concepts, theories and applications of geospatial data, analysis and modeling in GIS and Remote Sensing. The techniques taught enable students in a studio setting with self-defined projects to not only enhance analyzing, assessing and modeling of geospatial and temporal physical and non-physical processes in landscapes, but also learn how to design, collect and manage GIS projects in general. The lectures, labs and projects include stakeholder interaction providing potential project datasets, real life challenges and feedback targeted for students in Geography, Data Science, Engineering, Planning, Geology, Environmental Science, Ecology, Economics and Health Sciences.

New: The course will feature presentations of GIS research and industry experts as well as data that can be used by the participants. These experts are invited to introduce students to today's GIS challenges and needs as well as providing students with data sets to work on. At the end of the semester these experts will listen and critique the students projects in a presentation that will be open to the public during the final workday of Earth Day Week (April 26th). This is a unique chance for students to interact with experts and potential future employers and demonstrate their skills and ideas.

Required Textbook: There is no textbook.

Required Materials: A USB memory stick or external hard drive for data backup (at least 8 GB free space must be available for this class!).

Schedule: Please note, that the schedule is not updated during the semester. It is intended to give students not enrolled in this course a course overview. Enrolled students must check the official UBlearns course homepage for latest updates.

Week	M/W	Monday Lectures (144 Wilkeson)	Wednesday & Friday Case Studies (145 Wilkeson)
1	Jan 28/ 30	Intro Lecture: Geospatial Project Management - A Brief Introduction	***Lab 1-1: GeoProMT Hands-on***
2	Feb 4/6	Lecture 1: The Future of GIScience and GIEngineering	***Lab 1-2 (Guest 1): Data Gathering***
3	Feb 11/13	Lecture 2: Data Preprocessing	***Lab 2 (Guest 2): An Introduction to R***
4	Feb 18/20	Lecture 3: Digital Elevation Models and Terrain Analysis	***Lab 3 (Guest 3): Spatial Data Processing with R***
5	Feb 25/27	Lecture 4: Geospatial Analysis in GIS	***Lab 4 (Guest 4): GeoProMT & R***
6	Mar 4/6	Lecture 5: Graphical User Interfaces	***Lab 5 (Guest 5): Mapping Exercise***
7	Mar 11/13	Lecture 6: Raster-based Geospatial Modeling in GIS	**Students Project Idea Presentation (2 min oral + 1 min discussion)**
	Mar 18/20	*Spring Break*	*Spring Break*
		Project Proposal & Design …	**… Study is due by Midnight Mar 25**
8	Mar 25/27	*Project Preparations (cont.)*	**Project Proposal & Design Study (2 min oral presentation)**
9	Apr 1/3	*Project Preparations (cont.)*	*Project Preparations (cont.)*
10	Apr 8/10	*Project Preparations (cont.)*	*Project Preparations (cont.)*
11	Apr 15/17	*Project Preparations (cont.)*	*Project Preparations (cont.)*
12	Apr 22/24	***No class (instructor available); All Project Presentations **** are due as digital copy through UBlearns on Apr 24 End of Day**	***8:30-Noon Project Presentations**'*** ***All Project Reports****** **are due as digital copy through UBlearns on FRIDAY Apr 26 End of Day**
13	Apr 29/May 1	***Review Assignments will take place in class; Class meets as a single group for the last time***	**No Class (instructor available)** ***All Annotated Reports and Review Sheets*** **are May 6 End of Day**
14	May 6/8	***Project Report (Review Session) 2 groups (bring 2 hard copy reviews)***	***No class (instructor available) All Revised Project Reports are due on May 10 End of Day***

Activities: Students are evaluated [% of total grade] based on their performance in

- [16%] 4 lab reports (usually 1 page written text + additional flow chart, figure or map);
- [4%] project idea presentation (3 minutes oral presentation + 2 minutes discussion; no power point/no handouts needed),
- [10%] ***design study** due Mar 2 (abstract minimum of 250 words; additional details minimum of 750 words; incl. data flowchart) and project proposal presentation on **Mar 13** (3 minutes oral presentation + 2 minutes discussion; no power point/no handouts needed),
- [20%] **project presentation (3 minutes presentation + 2 minutes discussion; due electronically through UBlearns on **Apr 24 End of Day**),
- [30%] ***project report (minimum of 2500 words; due electronically through UBlearns on **Apr 26 End of Day**),
- [5% for written; 5% for oral review] project review comments as filled out review sheets (bring 2 hard copies each for the three reviewed reports to class) and marked up reports (electronically only online) are due **on May 1 End of Day**; the review itself works as follow: 1.) students are separated randomly into smaller groups of 4-6 students 2.) the students will meet the instructor and exchange their review and comment within that small group rather than in front of the entire class),
- [max. 5%] attendance in classes and lab sessions is required (each time one misses a class without an excuse1% will be deducted), and
- [up to 5% or even higher] active participation in classes and lab sessions (approach instructor at the end of each class or lab to claim 1% for your positive or constructive Q & A).

The project proposal and design study, the project presentation, and the project report are evaluated based on the following key (you have to address all five aspects):

1. Introduction and Problem Definition [includes abstract or executive summary] (20%),
2. [Proposed or Used] Approach and Methods (20%),
3. [Expected or Actual] Results and Discussion (20%),
4. [Expected] Conclusions, Recommendations, and Summary (20%)
5. Graphic Support/References (20%) [here is a suggested Format for Citations; however, this is only a style recommendation, you may chose any style as long it is consistent to a specific format, e.g. according to a professional journal or as suggested by the software EndNote. Only if there are inconsistencies, I will point those out and deduct points accordingly]. **Please note that the instructor may use the on-line software Turn-It-In to check submitted material for correct referencing of sources.**

The final letter grades are A (90-100%), A- (85-89%), B+ (80-84%), B (75-79 %), B- (70-74%), C+ (65-69%), C (60-64%), C- (56.6-60%), D+ (53.3-56.6%), D (50-53.3%), and F (0-50%).

The topic for the project proposal and design study, the project presentation, and the project report is subject of the participant's own choice. The topic should be related to the course objectives dealing with some type of a landscape-based GIS and/or terrain modeling issue as presented in the course (that means that your project does not necessarily have to be related to natural resource or hazard management; this could be a landscape-based analysis of transportation, business, archeology, etc.; suggestions of topics by participants are encouraged and should be discussed with instructor in advance).

Most of the reading material for additional information and potential projects are provided for you during the instructor's office hours or two hours and overnight loan through the Undergraduate Library in Capen Hall:

Burrough & McDonnell "Principles of Geographic Information Systems"
Goodchild, Parks & Steyaert "Environmental Modeling with GIS"
Goodchild, Steyaert & Parks "GIS and Environmental Modeling: Progress and Research Issues"
Clarke, Parks & Crane "Geographic Information Systems and Environmental Modeling"
Wilson and Gallant "Terrain Analysis - Principles and Applications"
Brooks et al. "Hydrology and the Management of Watersheds"
Turner, Gardner & O'Neill "Landscape Ecology in theory and practice: pattern and process"

Note that the selection of individual project topics should be discussed with the instructor at least two weeks before their due date. Students registered at the 400 level will require about 1/3 less reading and writing requirements and will not be evaluated at an advanced graduate level.

Student Learning Outcomes Geo 475 GIS Data Science Project Management (Title) - Landscape Modeling with GIS (Subtitle):

Instructor: Chris S. Renschler

Student Learning Outcome	Program Outcomes /Competencies	Instructional Method	Assessment Method
Knowledge	Student demonstrates a mastery of data, facts, information; makes a compelling analysis/argument of their significance in locational outcomes	Lecture, Case Studies, Class Discussions, Student Project	Project Idea Presentation, Project Design Report and Presentation, Project Report and Presentation, Participation
Thinking	Student recognizes spatial/locational relationships; assesses locational problems and patterns with sophistication	Lectures, Case Studies, Class Discussions, Student Project	Project Idea Presentation, Project Design Report and Presentation, Project Report and Presentation, Participation
Skills	Student fully understands and correctly uses valid/appropriate method and demonstrates techniques in theory and/or in practice independently	Class Discussions, Student Project	Project Idea Presentation, Project Design Report and Presentation, Project Report and Presentation, Participation
Critical reading	Student reads sources critically, fleshing out the arguments, perspectives, and contexts in them	Supplemental Material to Lecture for Reading, Review of Project Report and presentations of Peers	Participation, Review Process (oral and written)
Academic written voice in project report	Student writes course project report clearly and forcefully and has an argument/hypothesis that is well-founded, persuasively made, and tight	Student Project Design and Project Report, Review Comments	Project Design Report, Project Report, Participation, Review Assessment
Oral presentation and discussion of course project	Student presents course project logically and creatively; engages in question and answer; contributes to class discussion by formulating thorough answers and questions and engaging with teams or classmates	Student Project	Project Idea Presentation, Project Design Presentation, Project Report Presentation, Oral Review Comments, Participation