



## Geography 476/676 Geographic Information Systems I Syllabus - SEM II 2013-14

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Office hours:

### Course meeting times:

	Day	Hour	Location
Lecture	Tuesdays & Thursdays	10:00 - 10:50	Sci A 201
Lab Sec 1, 84	Wednesday	10:00 - 11:50	Science B326
Lab Sec 2, 841	Friday	10:00 - 11:50	Science B326
Lab Sec 3, 842	Thursday	3:00 - 4:50	Science B326

**Introduction and justification:** Geographic information is a prominent component in social, commercial, scientific and governmental interactions and endeavors. Development of applications, technology and information accessibility contribute to the use of geographic information for infrastructure and resource management in government, corporate, commercial and not-for-profit enterprises. This progress contrasts with the seemingly intuitive reliability, unquestioned credibility, and trustworthiness of geographic information in our technically enabled lives vis-a-vis mobile and Internet map applications. Leveraging geographic information for inquiry, optimization, modeling, problem solving, and decision-making requires more robust understanding of the means and methods to handle and analyze spatial data with geographic information systems (GIS).

**Concise description:** Geography 476/676 is an investigation and exploration of the theory and application of GIS, how to do GIS work. It presents an overview of general principles paired with practical experience in the analytical use of spatial information grounded by critical thinking skills. This course is designed for the student who wants to master and apply spatial analysis theory and technique to inform a chosen social or environmental discipline. Geography is a social science and Geog 476 embraces the social and technical contingencies that frame and give meaning to GIS design, implementation and application.

### Course learning outcomes

- Identify and describe the fundamental principles of geographic information and measurement.

- Correctly identify attribute levels of measurement and describe their advantages and limitations for data integration and analysis.
- Perform operations to adjust levels of measurement, join relational tables, summarize, and query attribute data.
- Read and write data flow diagrams that describe the core operations of a spatial analysis.
- Perform spatial and attribute queries using Boolean Logic and conditional equations.
- Design and execute overlay operations using multiple data layers and data models to meet analysis criteria.
- Describe and apply the logic of overlay combinations for multiple data layers.
- Explain the merits and limitations of distance measurements in vector and raster data models.
- Apply proximity/distance operations to discretize and classify a landscape.
- Describe how surfaces are represented in GIS, their topology, and common analyses to detect and describe surface characteristics.
- Design and apply neighborhood operations to analyze continuous or categorical surfaces to modify texture and detect edges.
- Describe the differences and similarities between overlay attribute combination and neighborhood attribute combinations.
- Describe the properties of iterative operations and how these are present in analyses of drainage, watershed and least cost path.
- Explain the logic and methods used to interpolate and transform vector data into surfaces.
- Apply critical thinking skills to construct and deconstruct geospatial data and analyses.
- Design and execute a spatial analysis to solve or address a problem statement or questions.

**Prerequisites:** Any geography, CNR, or environmental science course.

**Recommended background:** Themes in 476 builds upon and extends concepts introduced in [Geog 279](#) and is strongly recommended as preparation although not required. Geog 476 is an applied computer course and does not cover basic or introductory computer instruction. Facility with Microsoft's Windows operating systems and experience with personal or business productivity software applications is expected. Prior exposure to GIS software is not required but will be advantageous. Contact the instructor if you are concerned about the suitability of your computer skills for this course.

**Instructor commitment:** The instructor will a) present clear, engaging, challenging lecture/lab presentations; b) keep the course on schedule; c) challenge each student to question; d) conduct fair and equitable evaluation of student work; e) encourage student participation; f) be available and accessible by email and office hours or appointments; g) be responsive to student needs/requests.

The instructor will not a) provide *the correct* answer without students' critical engagement of the question; b) scale grades to an established curve; c) pretend to teach; d) let students pretend to learn.

**Student commitment:** Students are required to engage with the course through regular attendance, active participation, and successful completion of all assignments. Students are also expected to read all assigned materials and to ask informed questions regarding the subject matter. As per the Student Handbook, students should anticipate two hours of course work for each hour of lecture or lab. Geog476 consists of two lecture and two lab hours a week meaning students can expect an estimated eight hours of self study beyond scheduled lecture and lab times. Students having difficulty completing the course work should consult with the instructor before falling behind.

**Student Rights and Responsibilities:** Your rights and responsibilities within the UWSP campus community, including required behavior by students and faculty within the classroom environment are detailed in these documents:

<http://www.uwsp.edu/admin/stuaffairs/rights/rightsCommBillRights.pdf>

<http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf>.

**Required text:** The course text is Nicholas Chrisman's *Exploring Geographic Information Systems*(2<sup>nd</sup> edition) published by Wiley. See UWSP text rental:

<http://www.uwsp.edu/centers/textrental/index.asp> for details. Additional reading assignments will be available through [UWSP Library E-reserve](#) and the lecture/lab pages on D2L.

Expected dates for completion of reading assignments are listed with the lecture/lab schedule [LINK HERE](#). Knowledge and understanding of required readings is expected prior to scheduled lecture and lab instruction and demonstrations. Readings for the software used in the course will draw from the [ArcGIS 10 online help](#) and Hillier's Manual for working with ArcGIS 10 ([Library e-reserve](#)).

**[Desire2Learn \(D2L\)](#):** The course D2L page is a resource for lecture, lab and assignment management. Students are expected to be familiar and proficient with all of D2L features and functions. Lecture/lab outlines are linked to online content, required readings and related assignments. Note: D2L course resources are not a substitute for attending lecture or lab. The lecture/lab content on D2L are not self-explanatory and do not support stand-alone self study. Drop boxes are used for submission of all course deliverables. Discussion forums for lecture, lab assignments and final projects are open dialogs for questions and answers and all students are encouraged to participate or observe the postings because these conversations extend the dialog for better understanding of the course learning outcomes.

**Attendance:** This course adheres to the [UWSP attendance policy](#). Attendance is expected for all class meeting and absences will be noted. Regular attendance and participation in lecture and lab sessions are an integral and essential part of learning in this course. Attendance may be taken with a sign-in sheet at the beginning of each lecture/lab. After three absences a two point penalty will be applied to your final grade and again for each absence thereafter; see the grading scale below. Many themes presented in lecture and lab are not addressed in the required reading or on D2L content. University organization-sanctioned events, class field trips, death in the family, serious illness, accident, or similar are justifiable absences and will be considered for accommodation and a reasonable amount of additional help outside of normal lecture, lab and office hours. Eligibility for accommodation in the case of absences or late work requires validation from a university representative, doctor, clergy, or other

supporting documentation. If you miss a class, even for a legitimate reason, you are still responsible for the material.

**Lectures:** Lectures introduce the core geographic information science concepts and practical applications that are further developed in the lab assignments. These build upon and extend material introduced in the required readings and concepts presented in prior lecture/lab meetings. They are the richest source of concise and accessible insight and knowledge needed to complete assignments and realize the course learning outcomes.

**Software:** Geog 476 is a software independent course where the fundamental concepts, techniques, and learning outcomes are relevant to all GIS software and applications. ESRI's ArcGIS software with extensions is used to illustrate course concepts presented in lecture and use by students in the lab exercises. Lecture and lab presentations introduce software fundamentals leading up to each lab exercise. Students' software proficiency develops in the lab exercises through experiential learning and critical thinking. Work to accomplish the lab exercises and software self study will require additional time investment outside the hours of scheduled lecture and lab meetings.

**SIAL Lab policies:** Lab policies are posted on bulletin boards in the SIAL. See Mary Clare Sorenson in the department office to receive keys for the lab. Please pay attention to the rules for the keys on the signed form especially the ones that will result in revocation of key privileges.

**Printing costs:** A paper copy of each team's final project report is the only required printed deliverable, all other assignments are electronic through the D2L dropbox system. All student printers are now handed through UWSP-IT so you will be charged for 5 cents for each B&W page (single side) as well as 15 cents for each color copy (single side). You start out with \$10 in a UWSP printing account for the semester (for all of your classes) and then are charged a fee at the end of the semester for any printing exceeding that initial balance. You can always check your student printing account on your myPoint portal page on the Finances tab. Most of your assignments that you hand-in will likely just be B&W copies and programming assignments will be graded through documentation (and final program) that you will deposit in your assigned class server directories.

**Labs:** Course lecture material is linked with practical application in six lab exercises and team projects using the ArcGIS software suite. Exercises include software operation instructions and questions that address the operations and course concepts. Exercises are worth between seven and ten points depending on difficulty; exercise questions are short answer worth 1-3 points each.

Answers to lab questions are graded according to the following criteria:

- Unacceptable - no credit: Answer is irrelevant, incorrect, or contains major flaws; clear misunderstanding of concepts or lack of effort.
- Satisfactory - partial credit: Answer addresses the subject but with minor flaws or is incomplete; does not exhibit mastery of concepts, techniques, problem solving, or critical thought.

- Good - full credit: Answer addresses the question directly and efficiently with appropriate and well reasoned application of concepts.

In most cases the exercises will require more time than available in a lab period (110 min) to complete and students should anticipate some additional time commitment. Exercises are due generally 7-10 days after they are assigned and submitted through D2L drop boxes. Exercises not submitted by the due date will not be graded. Exercises will be graded and reviewed in lecture the week after the due date. Students are expected to take ownership and responsibility for incorrect answers to lab exercises. Compare your answers to the answer sheets posted on D2L. Please consult by email or during office hours if you do not understand why your lab answers are incorrect

Exercise	Assigned	Due
Software introduction		NA
Ex. 1 Levels of measurement and attribute tables	see course schedule	
Ex. 2 Measurement frameworks		
Ex. 3 Overlay		
Ex. 4 Distance		
Ex. 5 Surfaces and neighborhoods		
Ex. 6 Iterative operations		

[Final project assignment](#) The final project is an opportunity to learn through direct experience and practical application. Students are expected to demonstrate mastery of the laboratory exercises and course concepts through project design and implementation. Final projects are accomplished in teams of three that are accountable at the team and individual levels. Group projects are student-designed initiatives to address an identified challenge requiring spatial analysis, some of it outside of class and laboratory hours. Even though the final project is team based each student must submit the team and individual assignment deliverables to their respective D2L drop boxes before the assigned due dates to receive a passing grade.

Components of the project assignment and delivery dates:

- Statement of personal interest
- Formation of student teams
- Project proposal statement
- Project implementation plan
- Project progress review appointment with instructor
- Project presentation
- Final project report

**Exams:** The midterm and final exams are worth 14 and 10 points respectively. They consist of short answer questions worth two points each. Each lecture and lab assignment has clearly stated learning outcomes that are directly related to the exams and project assignment. Students will receive a list of learning outcomes addressed in each exam a week before the exam date. Time management during the exams is important; delay will make it difficult to answer all questions completely. Students who do not take the midterm and final exams are not eligible for a passing grade.

Exam questions are graded to the following criteria:

- Unacceptable - no credit: Inappropriate, incorrect, incomplete; more wrong than right.
- Problematic - partial credit: Vague, insufficient detail, major inaccuracies, relevancy implied; more right than wrong
- Good - full credit: Clearly relevant, appropriate detail, no inaccuracies, thorough and complete; nothing wrong.

**Evaluation:** Final grades are based on points earned for successful completion of the lab exercises, group project assignments and exams.

50%	Laboratory exercises - Six exercises each worth 7 or 10 points.
10%	Final project team accomplishment - 10 points
15%	Final project individual contribution - 15 points.
15%	Midterm - 15 points.
10%	Final - 10 points

Grades will not be scaled except in extenuating circumstances. All students are eligible to earn an A; grades are not competitive.

**Grading scale:**

<u>Points</u>	<u>Grade</u>
93-100	A 4.0
90-93	A- 3.7
87-89	B+ 3.3
83-86	B 3.0
80-82	B- 2.7
77-79	C+ 2.3
73-76	C 2.0
70-72	C- 1.7
66-69	D+ 1.3
60-65	D 1.0
0 - 59	F

**Graduate 676 requirements:** Expectations and requirements for graduate students are

different The due dates, weights and grading scale for 676 are the same as 476 but the assignments and learning expectations are commensurate with graduate level studies. Lab assignments, midterm exam and final exam have additional or more challenging questions. Final projects are individual and should address element related to thesis or dissertation research. This is an opportunity to explore inherent spatial relationships and their implications for research. Projects can be a vehicle to develop and evaluate analysis strategies in preparation for more rigorous use. Project written reports should include sufficient description and detail to situate work in the discipline of choice and present conclusions that tie the project back to a larger research agenda.

**Plagiarism:** Plagiarism is defined in [Chapter 14 of the UWSP Rights and Responsibilities](#) section 14.03. You plagiarize if you use someone else's ideas, even if you paraphrase them, and do not cite them. All assignments submitted to D2L drop boxes are evaluated with Turnitin.com for plagiarism. Answers to exam questions or lab assignments that are too similar to be clearly original work will not receive a grade. See [http://www.plagiarism.org/plag\\_article\\_what\\_is\\_plagiarism.html](http://www.plagiarism.org/plag_article_what_is_plagiarism.html) for more explanation and steps you can take to avoid plagiarism.

**Disabilities:** Students with disabilities or requirements of any nature should meet with the instructor during the first week of classes to address satisfactory accommodation.

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"Simply put, the greater the student's involvement or engagement in the academic experience of college, the greater his or her level of knowledge acquisition and general cognitive development" (*How College Affects Students*, Pascarella and Terenzini, 1991)

### **Getting help and how to succeed:**

- *Attend lecture & lab meetings:* Regular lecture and lab section attendance is the single most effective investment toward success in Geog476. Lecture material builds upon and goes beyond the required readings as the foundation for the lab exercises. You should anticipate difficulty with timely completion of the lab exercises if you miss lecture/lab and do not recover.
- *Follow the learning outcomes:* The learning outcomes listed on the lecture and lab pages are the take home concepts of the course. They are what you need to know to succeed with GIS and are the basis for the lab exercises and exams.
- *Notetaking:* Taking notes during class meetings is a proven means of knowledge retention. Notes also help identify omissions and areas of difficulty during study and office hour consultations. Students are encouraged to share and compare notes with other students to improve understanding and learning.
- *Participate:* Participation is not part of the course grade even though it is one of the best ways to learn and reduce the time required to master course concepts. Ask questions in class and on the D2L discussion forums to receive answers that address your learning needs.
- *Meet with the instructor:* The instructor is available to address your individual learning

needs during office hours and by appointment. Scheduled office hours are open for drop-in consultation although prior scheduling is appreciated. Office hour topics include but are not limited to: a) further explanation of lecture material and lab exercises; b) software tech support; c) project design and troubleshooting; d) exam preparation; e) grading and evaluation discrepancies. Office hours and appointments are also open for study groups or project teams to focus on selected questions.

- *Submit assignments on time:* Prompt submission of required assignments by their due date to insure that you get points for the assignments.
- *Read the required readings:* Do this before the lecture/lab when they are discussed. Familiarity with the required reading is expected and serves as the foundation for lecture presentations. Required readings are part of the lecture quizzes.
- *Exam preparation:* Pay attention to the learning outcomes associated with the lectures and labs because these are basis for the quizzes, midterm and final. Make sure you know what is expected and practice answering the sample exam questions provided.
- *Final project:* Start early and don't delay, establish a clear and concise problem statement that all members agree upon, set up regular team meetings and attend them, establish team members' responsibilities early, identify and secure suitable data resources before it is too late, prioritize and coordinate task delivery, meet all assignment due dates.
- *Do your own work:* Any lab exercise deliverable or exam question with answers that are too similar to others' work to be unmistakably original will not receive a grade. Please take care to insure that your work is yours alone and not accessible to other students. All assignment deliverables are checked with [Turnitin.com](https://www.turnitin.com). See the section on plagiarism below.