

## Course Syllabus

# Geography 491/598: GIS For Water Resources

## Course Syllabus

Instructor Contact Information	TA Contact Information
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### Introduction and Overview

Geography 491/598 is a one-of-a-kind survey of GIS as it is used for water resources data storage, information retrieval, and analysis. It provides practical experience and problem solving with a specific GIS software package. Software may change from semester to semester, but the GIS software for Fall 2012 is ESRI ArcGIS Desktop® v. 10.1 and the ArcHydro add-on. Beyond providing practical experience the primary purpose is for you to immerse yourself in the literature and to develop a project for completion by the end of the semester using a subset of the tools you will experience in the course. A primary outcome of the course will be an e-portfolio that can be used to obtain employment upon graduation.

### Course Experiences:

This course focuses on a form of learning known as heutagogy that emphasizes not just learning but also learning how to learn. Besides self-direction, the result is not just an improved understanding of content, but an improvement in the skills needed to continue the learning process well beyond the course. In this style of learning in heutagogy *all* learning contexts, both formal and informal, are considered. There will be three general types of activities:

1. Lectures and discussion, followed by associated labs;
2. Literature review and critical literature evaluation, and
3. A project demonstrating newly acquired skills and focusing on learner interests.

### Specific Experiences:

The class is a 2.5 hour timeslot held once weekly. The class will begin with students providing a critical evaluation of an article of their choice from their bibliography (2 - 5 minutes each). Lectures will be delivered in class and will precede exercises when exercises are forthcoming (8 out of 15 weeks). Following the lecture, a short question-answer period will take place at the beginning of the class that will set the stage for the exercise. The remainder of each period will be devoted to working together on the exercises or projects. You are encouraged to form and work in teams but the assignment write-ups must be your own.

Exercises will also include a discussion component that is designed to demonstrate an ability to explain and compare approaches, share experiences, and collaborate. Grading will be based on a rubric which is linked to portions of the US Dept. of Labor Geospatial workforce guidelines.

Week Number	Content
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Week #1	Activities: No literature review
	Lecture: Introduction to GIS and water management
	Exercises: Tools day (set up accounts for Skype, VoiceThread, Mendeley; load ArcGIS 10.1 plus ArcHydro)

Week #2	Activities: Literature reviews (group 1)
	Lecture: Introduction to ArcGIS interface
	Exercises: EX-1: Introduction to ArcGIS Desktop (Due Week 3)
	Exercise discussion 1

Week #3	Activities: Literature reviews (group 2)
	Lecture: Data sources for GIS and water management
	Exercises: EX-2: Building a water GIS dataset (ex from San Marcos Watershed) (Due Week 5)
	Exercise discussion 2

Week #4	Activities: Literature reviews (group 1)
	Lecture: Geodesy, Map Projections and Coordinate Systems
	Exercises: EX-3: GPS (homework) (Due Week 6)
	Exercise discussion 3

Week #5	Activities: Literature reviews (group 2)
	Lecture: Spatial Analysis
	Exercises: EX-4: Spatial Analysis (Due Week 7)
	Exercise discussion 4

Week #6	Activities: Literature reviews (group 1)
	Lecture: Watershed delineation
	Exercises: EX-5: Watershed delineation (Due week 9)
	Exercise discussion 5

Week #7	Mid-Term Exam (practical in-class) (covers weeks 1-5)
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Week #8	Activities: Literature reviews (group 2)
	Lecture: Remote Sensing
	Exercises: EX-6: Using Remote Sensing to calculate evapotranspiration (Due week 10)
	Exercise discussion 6

Week #9	Activities: Literature reviews (group 1)
	Lecture: ArcHydro Groundwater
	Exercises: EX-7: Using ArcGIS.com (Due week 11)
	Exercise discussion 7

Week #10	Activities: Literature reviews (group 2)
	Lecture: GIS and Floodplain Mapping
	Exercises: EX-8: Creating a story map related to water (Due week 12)
	Exercise discussion 8

Week # 11	Activities: Literature reviews (group 1)
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	Lecture: GIS and Hydrologic Modeling
	Exercises: continue working on EX 7-8

Week #12	Activities: Literature reviews (group 2) Brief discussions of projects (group 1)
	Lecture: Hydrologic Information Systems

Week # 13	Activities: Brief discussions of projects (group 2)
	Lecture: Global Water Information Systems

Week #14	Activities: Discussion of projects (open discussion – all groups)
	Lecture: LIDAR for water resources management

Week # 15	Activities: Discussion of projects (open discussion – all groups)
	Lecture: Extending GIS with programming (Python)

Finals Week	Final Exam: Essay
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## Your Instructor

Academically, I have a BSEd (Earth Science / Biology - University of North Dakota 1974), MS (Geography - University of North Dakota 1980), MPhil (Geography - University of Kansas 1983), PhD (Geography - University of Kansas 1985), and a Graduate Certificate of Online Teaching and Learning (New Mexico State University 2007). I've taught junior high school (Milbank, South Dakota), high school (Cavalier, North Dakota), and university (Mankato State, North Texas State, Ohio State, NMSU). I write textbooks (as you might know if you look at your course text), and other educational materials (e.g. GIS for Dummies). My research interests include GIS applications, GIS design, and GIS education. If you really have nothing better to do you can visit my visual CV at: [www.visualcv.com/akadrgadget](http://www.visualcv.com/akadrgadget) where you can even download some of my articles.

I love to go for long walks that help me think, enjoy visiting natural settings like Dripping Springs, City of Rocks, and White Sands National Monument (all within easy driving distance). I have always loved working with my hands and still enjoy the occasional few hours working on scale models. My particular interest is in building historic ship models (both sail era and WWII) and, more recently, riverboats. I love to read, especially horror novels from Stephen King and Dean Koontz. My favorite pastime is watching DVD movies, especially comedies, and older films from the 1960s. I'm married now 28 years to Dolores, who is an awesome real estate agent with RE/MAX Classic (had to put in the plug). I love my home and spend as much time as I can there. I listen to rock and roll and classical and enjoy other forms a bit as well. In general I'm pretty easy going, fair, demanding (of myself as well as of my students), and have a passion for learning. I hope that rubs off on you.

## Course Objectives

This course has the following objectives:

1. Provide you with an opportunity to develop a project-oriented focused bibliography based on your own interests.
2. Allow you to demonstrate your command of the content of five (5) of the articles that are the most interesting or useful to your work.
3. Allow you to practice your presentation skills via your literature and your project presentations and the GIS content you turn in.
4. Gain an awareness of the types, availability, nature, and methods of obtaining and building a database with water-related data.
5. Become comfortable with the use of ArcGIS and ArcHydro tools for the storage, display, delineation, packaging, analysis, and dissemination of water and watershed data, information, and scenarios.
6. Become familiar with GPS, remote sensing, LIDAR, Hydrological Information Systems, Water Information Systems, as part of the larger discipline of water informatics.
7. Allow you to envision, design, create, and disseminate a Water GIS project related to your own interests and abilities.

## Required and Recommended Reading

**Textbook:** There is no textbook for this course nor are there any preselected reading assignments. As the semester progresses, each of you will be providing your own reading lists and sharing them via Mendeley. There are four books that are recommended based on your need to have a book to guide you:

1. ArcHydro Groundwater:

<http://www.esri.com/news/releases/11-1qtr/esri-press-publishes-arc-hydro-groundwater.html> (<http://www.esri.com/news/releases/11-1qtr/esri-press-publishes-arc-hydro-groundwater.html>) (useful for those interested in expanding their knowledge of hydrogeology).

2. ArcHydro:

[http://www.barnesandnoble.com/listing/2689385413018?r=1&cm\\_mmca2=pla&cm\\_mmc=GooglePLA-Book\\_45Up\\_-Q00000633\\_-2689385413018](http://www.barnesandnoble.com/listing/2689385413018?r=1&cm_mmca2=pla&cm_mmc=GooglePLA-Book_45Up_-Q00000633_-2689385413018) ([http://www.barnesandnoble.com/listing/2689385413018?r=1&cm\\_mmca2=pla&cm\\_mmc=GooglePLA-Book\\_45Up\\_-Q00000633\\_-2689385413018](http://www.barnesandnoble.com/listing/2689385413018?r=1&cm_mmca2=pla&cm_mmc=GooglePLA-Book_45Up_-Q00000633_-2689385413018)) (I'm trying to get you access to a pdf of this but haven't had much luck so far)

3. Hydraulic Modeling in GIS: <http://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=204&moduleID=0> (<http://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=204&moduleID=0>) (for those interested in a more detailed knowledge of hydraulic modeling)

4. Hydrologic and Hydraulic Modeling Support with Geographic Information Systems [Paperback]

[http://www.amazon.com/Hydrologic-Hydraulic-Modeling-Geographic-Information/dp/1879102803/ref=pd\\_sim\\_b\\_4](http://www.amazon.com/Hydrologic-Hydraulic-Modeling-Geographic-Information/dp/1879102803/ref=pd_sim_b_4) ([http://www.amazon.com/Hydrologic-Hydraulic-Modeling-Geographic-Information/dp/1879102803/ref=pd\\_sim\\_b\\_4](http://www.amazon.com/Hydrologic-Hydraulic-Modeling-Geographic-Information/dp/1879102803/ref=pd_sim_b_4)) (a resource including both hydraulic and hydrologic modeling)

## Prerequisites:

### Course Prerequisites

Prerequisites: As a one-of-a-kind course it is difficult to set prerequisites. Generally one would expect that those lacking a GIS background would enter the course with a solid water science/hydrology background and those lacking in water science/hydrology would have a solid GIS background. These complementary skills will be merged through the learning community, in particular during the exercises and the project. Part of the outcome of this course will be a finalized course in water informatics with a standardized set of prerequisites.

### Tech Skill Prerequisites

Students are expected to be more than proficient in using Microsoft Windows-based PCs and be able to perform common tasks such as logging in, copying and deleting files, creating folders, searching for content on the hard drive, searching for content on the Web, etc. Students are expected to be more than proficient in using Microsoft Office (Word, Excel, PowerPoint, and/or Publisher). Previous experience in reading and understanding maps and using on-line map tools such as Google Maps (<http://maps.google.com> (<http://maps.google.com/>)) and Mapquest (<http://www.mapquest.com> (<http://www.mapquest.com/>)) is required. All other skills will be taught in the class.

### Computer Equipment Requirements

While you will all have access to the Geography Department computer lab, it is HIGHLY recommended that you bring your own PC-Based laptop to avoid issues of movement of databases and loss due to administrative actions on the lab. If you are a mac user you will need to either use some form of vm ware or Bootcamp Assistant to partition your drive to include a version of Windows. ArcGIS, version 10.1 will be provided to you for one year (at which time it times out).

### Assessment

The table below indicates the graded components for learners in this course. The only difference is that graduate students will be required to both present their final projects and produce a term paper focusing on a journal in their discipline and following that journal's format.

Activity	Number	Grading Method	Points	Total Points
Literature Reviews	5	Rubric	40 points each	200
Exams	2	Essay grading	200 points each	400
Exercises	8	Rubric	100 points each	800

Project Reports (written)	1	Essay grading (graduate students only)	200	200
Project Reports	1	Rubric	200	200
Discussions (assignment)	8	Rubric	25	200
Totals (undergraduate)				1800
Totals (graduate students)				2000

### Late assignments:

Punctuality is not only expected in the workforce, it is demanded. As such all weekly assignments will be expected to be turned in on-time. **No late assignments will be accepted unless under special circumstances requiring documentation.** Final project and associated oral presentations are not accepted after the deadline.

Exceptions to this policy are at the discretion of the instructor and may be made for certain circumstances (e.g. bereavement, illness, university sponsored events, etc.), **but you must contact the instructors to make arrangements before the assignment is late.** We will make exceptions to the prior arrangements requirement in the event of tragic events such as car accidents, a major family emergency, etc. Again, this is at the instructor's discretion.

### Contacting your instructor:

Communication is critical in both face to face and online courses. Contacting your instructor is often based on a differential level of urgency. Other than visiting me during my office hours, below is the preferred method of contacting your lecture instructor depending on level of urgency:

- **Urgent:** (e.g. My computer has crashed, my internet is down, the dog ate my router)
  - Call me at (575) 496-5231 (expected response time between immediate to 2 hours)
- **Important:** (e.g. in need to talk to you about some material I don't understand, I would like to discuss a quiz, my dog is lying on the router)
  - Email me via Blackboard (expected response time 4 – 24 hours)
- **Non-Course Related (not urgent):** (e.g. I would like to talk about employment, change of major, a research project, etc. My dog is sniffing my router)
  - Email me via [demers01@gmail.com](mailto:demers01@gmail.com) (<mailto:demers01@gmail.com>). Expected response time 24 to 36 hours

If you need a long time you can either come to my office hours or use one of the methods above and we can use Skype, Vsee, gmail chat, or another form of interaction, depending on your circumstances.

### Rules of Conduct

Because this course relies heavily on learning community it is essential that we all (students and instructors alike) treat each other professionally and with respect. It is important to adhere to the basic forms of netiquette found at the following website:

<http://www.albion.com/netiquette/corerules.html> (<http://www.albion.com/netiquette/corerules.html>)

Plagiarism is serious and comes with often devastating circumstances. Please refer to the discussion of plagiarism in the student handbook for more information found here: <http://www.nmsu.edu/~vpsa/SCOC/misconduct.html> (<http://www.nmsu.edu/~vpsa/SCOC/misconduct.html>).

### Students with Disabilities

If you have or believe you have a learning disability, you are free to self-identify. You can do so by providing documentation to the [Office for Services for Students with Disabilities](http://www.nmsu.edu/~vpsa/SCOC/misconduct.html) (<http://www.nmsu.edu/~vpsa/SCOC/misconduct.html>), located at Garcia Annex (telephone: 646-6840). Appropriate accommodations can then be provide for you. If you have a condition which may affect your ability to exit safely from the premises (e.g. Breland 192) in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the director of Disabled Student Programs. If you have general questions about the Americans with Disabilities Act (ADA) call 646-3333.

Date

Details

