
Watershed Sciences 4930 & 6920

GEOGRAPHIC INFORMATION SYSTEMS

WEEK ONE – Lecture 1

Introduction to Course & Review of Maps

Joe Wheaton



WATS 4930

PURPOSE OF TODAY'S LECTURE:



"Introduction to Course & Review of Maps" is to:

- Cover Introductions
- Go through syllabus & define goals of course
 - Manage your expectations about course & my expectations of you
 - Answer any questions you have about course logistics
- Review some basics about maps to help you do better on lab assignments and a more effective communicator with maps



WATS 4930

TODAY'S PLAN

- I. **Introductions**
- II. Syllabus
- III. Review of Maps
- IV. Questions/Summary



WATS 4930

WHO IS THIS JOE WHEATON GUY?

- Assistant Professor in Watershed Sciences (since 2009)
- Fluvial Geomorphologist
- Education:
 - Started studying Civil Engineering at Utah State University
 - BSc in Hydrology from University of California at Davis
 - MS in Hydrologic Sciences from University of California at Davis
 - PhD in Geography at University of Southampton (England)
- Professional Background:
 - Consulting Civil Engineering (California - 4 years)
 - Researcher – Fluvial Geomorphology & Ecohydraulics (since 2000)
 - Lecturer (i.e. Assistant Professor) in Physical Geography at Aberystwyth University (Wales – 2 years)
 - Research Assistant Professor in Geology at Idaho State University (1 year)



WATS 4930

YOUR TA & UTF

- Shannon Belmont – Lab Instructor
 - Be nice to her as she'll be grading your work!
- Erin Fleming – Undergrad Teaching Fellow



WATS 4930

HOW MANY OF YOU....

- Registered for this course because you were told you had to?
- Registered for this course because you thought it might be interesting and you wanted to learn a valuable skill?
- Have changed your major?
- Have some GIS experience
- Taken a GIS course before
- Like maps
- Want to be here



beckstrombuzz.blogspot.com/2010/08/changing-majors.html

WHAT CLASS IS RIGHT FOR YOU?

About the Courses (Syllabi)

This page and its sub-pages act as the syllabi for the following Advanced GIS courses offered through Watershed Sciences:

- WATS 4930/6920 - Advanced GIS & Spatial Analyses (3 credits) - 10 Weeks
- WATS 4931/6921 - GIS Research Projects (2 credits) - 5 Weeks
- WATS 6915 - GIS Fundamentals (1 credit) - 4 Weeks

Which Course(s) Should I Take?

WATS 4930/6920 is what you should take if you want to get a comprehensive understanding of GIS and advanced spatial analyses. GEOG 1800 is a prerequisite for WATS 4930.

WATS 6915 is the first four weeks of WATS 6920.

The course is targeted at graduate students who want a crash course or refresher introduction to GIS, but don't have the time or need for the full 10 week course. No prior GIS experience is necessary, but the pace is rapid. Its perfect for someone wanting to know how to make some basic maps for their thesis or dissertation, as well as an introduction to building interactive web maps and doing basic spatial analyses.

WATS 4931/6921 is a five week follow up course to WATS 4930/6920, which puts the skills and principles learned in Advanced GIS & Spatial Analyses into practice through student research projects. WATS 4930 is available for capstone credit to Watershed Sciences students. Students will prepare a poster to present in poster session and a mock manuscript for potential publication.

Syllabus Topics

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[Catalog Description](#)

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WATS 4930

WATS 4930/6920 – 10 INTENSE WEEKS

WATS 4930: 27
WATS 6920: 28

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WATS 4930

WATS 4931/6921 – 5 MORE WEEKS

WATS 4931: 5

WATS 6921: 7

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WATS 4930

WATS 6915 – 4 INTENSE WEEKS

WATS 6915: 8

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WATS 4930

DEATH-GRIP ON THE OBVIOUS

What your friends said about this course was probably true... it is a lot of work



SURGEON GENERAL WARNING:

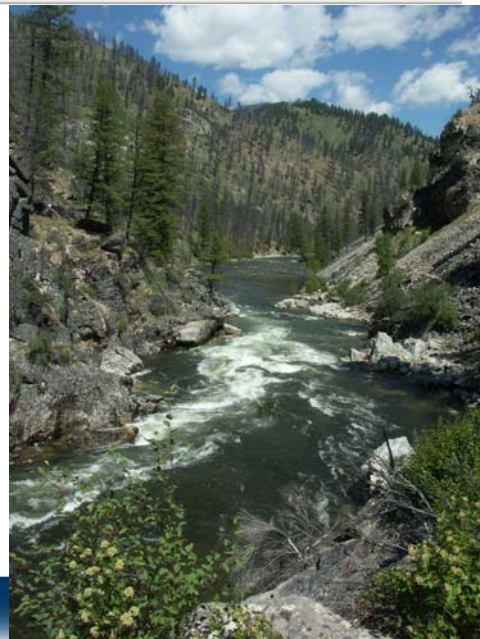
These classes are a ton of work!
Continuing may cause headaches, shortness of breath, loss of sleep, and increased stress levels. But you just might learn a lot about GIS too.



WATS 4930

INTRODUCE YOURSELF (< 5 sec.)

- Just your First Name
- Where You're From



TODAY'S PLAN

- I. Introductions
- II. Syllabus
 - I. Primary Learning Outcomes
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 - IV. Text & Software
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ADVANCED GIS COURSES
WATS 4930/6920, 4931/6921, 6915

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Syllabus Topics

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- Catalog Description
- Course Policies
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- How to Register (Spring 2012)
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WATS 4930

ALL YOU NEED TO KNOW...

ADVANCED GIS COURSES
WATS 4930/6920, 4931/6921, 6915

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WATS 4930

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WATS 4930

[About the Courses \(Syllabi\) >](#)

Primary Learning Outcomes

1. Understand the fundamental theory of Geographic Information Science behind Geographic Information Systems (GIS), and in so doing build an awareness of what GIS can and cannot be used for
2. Become proficient in the use of GIS tools to conduct spatial analyses and build maps that are fit-for-purpose and effectively convey the information they are intended to
3. Build confidence in teaching your-self how to undertake new analyses (unfamiliar to you) using GIS, troubleshooting problems in GIS, and seeking help from the GIS community to solve your problems
4. Use GIS analyses to address applied problems and/or research questions
5. Become effective in building maps that can be shared with non-GIS users (e.g. PDF maps and interactive webGIS maps)

The above learning outcomes apply to the courses as follows:

Learning Outcome:	WATS 4930/6920	WATS 4931/6921	WATS 6915
1 - GIS Theory	Core	NA	Core
2 - Proficiency in Spatial Analyses & Cartography	Core	Partial	Partial
3 - Self-Teaching & Troubleshooting	Core	Core	Partial
4 - Spatial Analysis in Research	NA	Core	NA
5 - Communicating with GIS	Core	Core	Core

GIS in the Field



GIS being used in the field, here with a ground-based LiDAR.



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WATS 4930

BROAD TOPICS

- Introduction/Review of GIS
- Abstracting the World to Digital Maps
- Working with Data in GIS & Geoprocessing
- Uncertainty & Vector Analyses
- Raster Analyses
- GIS Modeling
- Collecting Your Own Data

Approximate Schedule

GIS Course(s)	Semester Week	Course Topics	Dates	Lab
4930, 6920, 6915	WEEK 1	Introduction/Review of GIS	Jan 10 & 12	1. ArcGIS Refresher/Intro & WebGIS
4930, 6920, 6915	WEEK 2	Abstracting the World to Digital Maps	Jan 17 & 19	2. Coordinate Data, Projections, & Transformations
4930, 6920, 6915	WEEK 3	Working with Data in GIS	Jan 24 & 26	3. Reproducing Maps - Geologic Map
4930, 6920, 6915	WEEK 4	Working with Data in GIS	Jan 31 & Feb 2	4. Digitizing & Editing & Sharing Data
4930 & 6920	WEEK 5	Vector Analyses	Feb 7 & 9	5. Vector Analysis
4930 & 6920	WEEK 6	Raster Analyses & Digital Elevation Modeling	Feb 14 & 16	6. Working w/ DEMs
4930 & 6920	WEEK 7	Raster Analyses & Uncertainty in GIS	Feb 21 & 24	7. Building DEMs
4930 & 6920	WEEK 8	GIS Modeling	Feb 28 & Mar 1	8. Morphometric Analyses
4930 & 6920	WEEK 9	Collecting Your Own Data	Mar 6 & 8	9. Georeferencing
Spring Break - March 12-16				
4930 & 6920	WEEK 10	Collecting Your Own Data	Mar 20 & 22	10. Blimp Lab

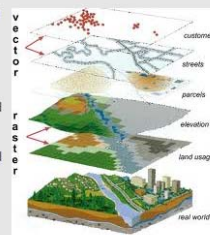


COURSE TOPICS

Course Topics

These courses are organized into a series of [topics](#), which we will cover in the order listed below. For each topic, you will find downloads of lecture materials, links to [reading assignments](#), links to [lab assignments and materials](#), and additional information. Please note, that:

- topic pages may not be fully populated until we get to that topic in lecture; some lecture topics will appear populated with lectures and content from the previous year's lecture.
- topic pages may be updated even after we've covered a topic as typos and inconsistencies are brought to our attention or as we find new material that may help you better understand a topic
- if you find any problems or something that is confusing, please post a comment or question to the [appropriate topic forum](#).



WATS 4930/6920 Topics

Note that Weeks 1-4 are WATS 6915 Topics.

Course Topics (by week)

Research Topics

Week 01: Introduction/Review of GIS

Week 02: Abstracting the World to Digital Maps

Week 03 & 04: Working with Data in GIS

Week 05: Uncertainty & Vector Analyses

Week 06 & 07: Raster Analyses

Week 08: GIS Modeling

Week 09 & 10: Collecting Your Own Data



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WATS 4930

TOPIC PAGES ARE A REFERENCE

Course Topics > Week 02: Abstracting the World to Digital Maps

Contents

- 1 Background
- 1.1 Introduction to Topic
- 1.2 Why we're covering it
- 1.3 Learning Outcomes
- 2 Lectures
- 2.1 Projections & Coordinate Systems
- 2.2 Data Types
- 3 Additional Resources
- 3.1 Data Types
- 3.2 Projections & Coordinate Systems
- 3.3 Making Good Maps

Key Links and Dates

Lecture Dates:
See Calendar
Reading Assignments:
See them for Reading Assignments
Lab Assignments:
Lab 02 - Making Good Maps from Existing Data & Georeferencing
Discussion:
Week 02

Background

Introduction to Topic

The spatial or geographic representation of the world has to be abstracted into specific data types to be used in GIS. GIS is all about data and until you appreciate how that data is represented digitally you can not make effective maps. Data is added into maps in GIS as layers which can be overlaid.

One of the most frustrating and typical complaints of GIS students is that 'my data just disappeared!' It was there when I saved it now it's gone! This is indicated by the notorious red exclamation point next to your layer. The reason for this is simple, the link between your map document and the location the data was previously stored has been broken. Many things can break it, and it is easy to [repair](#).

Another common complaint amongst naive and newbie GIS users is that 'my data doesn't line up when I overlay it!' This is most typically because a [projection](#) and [coordinate system](#) was either not or not correctly defined.

This week, we will help you better understand how data is represented in GIS and how those layers are projected



Lectures

Projections & Coordinate Systems

Here we dive into the details of what allows us to overlay data so seemingly seamlessly in GIS: projections and coordinate systems. Without projections and coordinate systems, GIS would not be possible.

- [Tuesday Lecture - PDF](#) w/ 2 slides per page
- [Tuesday Lecture - PDF](#) w/ 6 slides per page

Data Types

Here we review what you should already know, but will surely have forgotten because it is not so exciting. We'll try and make it interesting...

- [Thursday Lecture - PDF](#) w/ 2 slides per page
- [Thursday Lecture - PDF](#) w/ 6 slides per page

Additional Resources

Below are some very useful references on projections and coordinate systems from ESRI's online help (ArcGIS Resource Center), which you should browse through and make sure you understand.

- [How a GIS represents and models geographic information](#)

Data Types

- [Three fundamental representations of geographic information layers](#)
- [About Geographic Data Formats](#)
- [In Geodatabases](#)
 - [Feature Class Basics](#)
 - [Raster Basics](#)

Projections & Coordinate Systems

- [Georeferencing and Coordinate Systems](#)
- [What are map projections?](#)
- [Projection Basics for the GIS Professional](#)
- [Identifying an unknown coordinate system](#)

Making Good Maps



WATS 4930

CALENDAR ON GIS.JOEWEATON.ORG

GIS Classroom

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 - Reading Assignments
- Class Announcements
- Class Calendar**
- Great Maps!
- Class Forum
- GIS Class LibGuide
- Help
- © 2011 - Disclaimer & Copyright

Utah State University Links

- Canvas (Submit Assignments)
- Department of Watershed Sciences
- Banner Access
- Current Students
- Prospective Students
- Open Course Ware

Other Links

- ESRI Support
- ArcGIS 10 Help

Class Calendar

These calendars shows the course and lecture schedule (updated regularly). It does not show due dates for assignments. See [here](#) and the [Canvas](#) Calendar for assignment deadlines and instructions.

Contents

- 1 WATS 4930/6920
- 2 WATS 4931/6921
- 3 Joe's Office Hours

Note: You can click on any event to see information on the lecture topic (under description). If you use Google Calendars, you can save it to your own Google Calendar.

WATS 4930/6920

WATS 4930/6920, 6915 Lecture Schedule

Today Tuesday, January 10

Print Week Month Agenda

Tuesday, January 10

10:30am Lecture - Intro to Course & GIS Review - WATS 4930/6920/6915

Thursday, January 12

10:30am Lecture - Intro to WebGIS & Review of GIS - WATS 4930/6920/6915

Tuesday, January 17

10:30am Lecture - Projections & Coordinate Systems - WATS 4930/6920/6915

Thursday, January 19

10:30am Lecture - Data Types - WATS 4930/6920/6915

UtahStateUniversity

WATS 4930

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WATS 4930/6920, 4931/6921, 6915

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- WATS 6915 - GIS Fundamentals (1 credit) - 5 weeks

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UtahStateUniversity

WATS 4930

LABS ARE EVERYTHING!

- You only really learn GIS by doing it
- WATS 4930/6920
 - 10 Guided Labs
 - Due following week
 - 1 Self Paced Lab
- WATS 6915
 - First 4 Labs
 - Due them at your own pace... BUT

Assignments > Labs

Below are links to each of the lab assignments. Please note that many of these lab pages will not be completely populated/updated until a lab is **assigned**. Even after a lab is assigned, the online instructions may be updated to provide clarifications, fix typos, or elaborate on points of confusion as they arise (so refresh F5 your browser often to override pages stored in your web browser's cache). If you find any problems with an assigned lab, please post a thread to the relevant lab forum on the [Class Forum](#). See [here](#) for more information on the [lab facilities](#) and [here](#) for more information on [lab software](#). WATS 4930/6920 students will complete labs 1-10 below and the self-paced ESRI Training lab. WATS 6915 students will only complete labs 1-4. WATS 4931/6921 students will complete the project lab(s) in addition to their [project](#).

Lab Assignments


- Lab 01 - ArcGIS Refresher & Intro to WebGIS
- Lab 02 - Coordinate Data, Projections & Transformations
- Lab 03 - Reproducing Maps - Geologic Map
- Lab 04 - Digitizing, Editing & Sharing Data
- Lab 05 - Vector Analyses
- Lab 06 - Working with DEMs
- Lab 07 - Building DEMs
- Lab 08 - Morphometric Analyses
- Lab 09 - Georeferencing
- Lab 10 - Blimp & Georeferencing
- Lab Self Paced - ESRI Free Training
- Old Labs
- Project Lab 01 - Error Analysis with your Project

Note: SP stands for self-paced

Lab Submission Guidelines

In [Lab 01](#), you will learn how to create your own website using Google Sites. You will maintain your own website for at least the duration of the course. All of your lab assignments will be produced as one or more web pages on your website. The GIS maps you produce will either be ECES (hosted on your website), images or dynamic google maps (specified in each lab's instructions). For each lab, these maps will be embedded in web pages you create so you can share them with anyone. Your

Fieldwork for Lab 10




gis.joewheaton.org/assignments/labs

WATS 4930

LABS CAN BE DONE ANYWHERE

- Data you need is online
- Instructions are spelt out on lab pages often w/ video tutorials
 - Bring headphones!
- ALWAYS backup to a portable drive
 - As often as you're comfortable redoing something
- Encourage you to work off your own machine

Assignments > Labs > Lab 01 - ArcGIS Refresher & Intro to WebGIS

Contents

- 1 Introduction to Lab
 - 1.1 Background
 - 1.2 Prerequisites
- 2 Lab Objectives
- 3 Lab Tasks
 - 3.1 Task 1 - Create Study Site Map
 - 3.2 Task 2 - Create your own GIS Website
 - 3.3 Task 3 - Publish Maps to Your Website
- 4 What to Submit
- 5 Suggested Instructions & Workflows
- 6 Additional Resources
 - 6.1 Lab Introduction Lecture Slides
 - 6.2 Related Tutorials & Help for ArcGIS
 - 6.3 Related Tutorials & Help for Google Sites

Key Links & Dates

Corresponding Lecture Topic(s)
[Week 01: Introduction/Review of GIS](#)
[See All Dates](#)

Lab Due Date
 Submitted before start of next week's lab on [Canvas](#)
[See Calendar](#)

Relevant Discussion(s):

- [Lab 01](#)
- [Week 01](#)

Introduction to Lab

Background



In this lab we are refreshing your memory about (or introducing you to) ArcGIS (version 10) and reminding you about some of the critical steps in making good maps with ArcMap. There are usually multiple ways in ArcGIS to achieve the same endpoint, and for now we will just walk you through one workflow. As with all labs, we will separate the lab tasks and what you have to submit from some suggested instructions and/or workflows. Once we have created a map, we will export it in multiple formats, which we will publish as both static map figures and interactive webGIS maps on your own website.

For this lab, pretend that you are doing research (vaguely defined) at Tony Grove Lake. We simply need to draw a map of our study site and share that map with non GIS users.



WATS 4930

TODAY'S PLAN

- I. Introductions
 - II. Syllabus
 - I. Primary Learning Outcomes
 - II. Topics
 - III. Labs
 - IV. Text & Software
 - V. Course Policies
 - VI. Grades
- III. Review of Maps
 - IV. Questions/Summary

gis.joewheaton.org/about

The screenshot shows the 'ADVANCED GIS COURSES' page for WATS 4930/4920, 4931/4921, 4915. The main content area is titled 'About the Courses (Syllabi)' and lists various topics including 'Syllabus Topics', 'Alternative or Follow-Up Courses', 'Catalog Description', 'Course Policies', 'Format', 'Grades', 'How to Register (Spring 2012)', 'Instructors', 'Meeting Times & Place', 'Primary Learning Outcomes', 'Software', and 'Text & Readings'. A sidebar on the left contains a navigation menu with links to 'Home', 'About the Courses (Syllabi)', 'Grades', 'Instructors', 'Primary Learning Outcomes', 'Software', 'Course Topics', 'Assignments', 'Labs', 'Project (4931/4921)', 'Reading Assignments', 'Class Announcements', 'Class Calendar', 'Great Maps!', 'Class Forum', 'GIS Class LibGuide', 'Help', 'Utah State University Links', 'Canvas (Submit Assignments)', 'Department of Watershed Sciences', 'Banner Access', 'Current Students', 'Prospective Students', 'Open Course Ware', 'Other Links', 'ESRI Support', 'ArcGIS 10 Help', 'johndelton.org', 'Ecogeomorphology & Topographic Analysis Lab', 'Quinn Library Labs', and 'BBQR Lab'.



WATS 4930

SOFTWARE - ArcGIS

The screenshot shows the 'Software' page. The main content area is titled 'Software' and contains a section for 'GIS' which states: 'We will primarily use ESRI's ArcGIS 10 Desktop (ArcInfo version with all extensions), which is available for your use on all the QL304 and QL306 machines. As students taking this course, you are entitled to a free one-year student license of ArcGIS for installation on your personal computer (see [here](https://hd.usu.edu/software/) for details). Grad students, if you want a version for your research, it can be acquired through USU Software Licensing (<https://hd.usu.edu/software/>). The reason we use ArcGIS is because it is the industry standard and the vast majority of employers, universities and agencies you may end up working for will most likely be using ArcGIS as well. All of the principles and theory we learn in this course, will apply to any GIS software.'

Below this, there is a section titled 'Open Source Desktop GIS Alternatives to ArcGIS' with a list of alternatives:

- **MapWindow GIS** - Free, open source GIS desktop application and programming component (only runs in Windows)
- **LandScape** - Free GIS, that focuses on modeling of land surface (i.e. DEMS). Java based GIS runs in Linux, Mac and Windows
- **GRASS GIS** - Originally developed by the **U.S. Army Corps of Engineers**, open source, a complete GIS
- **SAGA GIS** - System for Automated Geoscientific Analysis- a hybrid GIS software.
- **Quantum GIS** - QGIS is an Open Source GIS that runs on Linux, Unix, Mac OS X, and Windows.

Below this, there is a section titled 'Website & WebGIS' which states: 'You are welcome to use any software, hosting and servers that you wish to use, are knowledgeable about and can support dynamic webGIS applications. However, it is strongly recommended that you use **Google Sites** for your website and **Google Maps** for your webGIS applications. We will only provide support for Google Sites and Google Maps in lab. The reason we suggest these is because they are free, easy-to-use, and require no programming experience. Moreover, **Google Maps** and **Google Earth** are familiar to most web users to whom your spatial analyses and maps might be targeted. However, there are plenty of viable free and commercial alternatives out there.'

The sidebar on the left contains a navigation menu with links to 'Home', 'About the Courses (Syllabi)', 'Grades', 'Instructors', 'Primary Learning Outcomes', 'Software', 'Course Topics', 'Assignments', 'Labs', 'Project (4931/4921)', 'Reading Assignments', 'Class Announcements', 'Class Calendar', 'Great Maps!', 'Class Forum', 'GIS Class LibGuide', 'Help', 'Utah State University Links', 'Canvas (Submit Assignments)', 'Department of Watershed Sciences', 'Banner Access', 'Current Students', 'Prospective Students', 'Open Course Ware', 'Other Links', 'ESRI Support', 'ArcGIS 10 Help', 'johndelton.org', 'Ecogeomorphology & Topographic Analysis Lab', 'Quinn Library Labs', and 'BBQR Lab'.



WATS 4930

TEXT

GIS Classroom

- Home
- About the Courses (Syllabi)
 - Grades
 - Instructors
 - Primary Learning Outcomes
 - Software
- Course Topics
 - Labs
 - Project (4931/6921)
 - Reading Assignments
- Class Announcements
- Class Calendar
- Great Maps!
- Class Forum
- GIS Class LibGuide
- Help
- © 2011 - Disclaimer & Copyright

Utah State University Links

- Canvas (Submit Assignments)
- Department of Watershed Sciences
- Banner Access
- Current Students
- Prospective Students
- Open Course Ware

Other Links

- ESRI Support
- ArcGIS 10 Help
- joewheaton.org
- Ecogeomorphology & Topographic

About the Courses (Syllabi) > Text & Readings

WATS 4931/6921 has no required text. WATS 4930/6920 & WATS 6915 share the same required text book:

Required Text:

- Bolstad, P., 2005. [GIS Fundamentals: A first text on Geographic Information Systems](#). Esder Press, 620 pp.

Dr. Bolstad has put a lot of resources associated with this book [online for free](#).

Other Readings:

See [here](#) for reading assignments.

Recommended Text:

You may think this is ridiculous, but much of what you need to know (and students frequently forget) is covered in this Dr. Seuss Book! In fact, the [six Cs you will be graded on](#) are based on principles outlined in this book that a 3 year old can understand!

Rabe, T., 2002. [There's a Map on my Lap! All About Maps](#). Random House Books, 48 pp.

WATS 4930

TODAY'S PLAN

- I. Introductions
- II. **Syllabus**
 - I. Primary Learning Outcomes
 - II. Topics
 - III. Labs
 - IV. Text & Software
 - V. **Course Policies**
 - VI. Grades
- III. Review of Maps
- IV. Questions/Summary

gis.joewheaton.org/about

ADVANCED GIS COURSES

WATS 4930/6920, 4931/6921, 6915

About the Courses (Syllabi)

This page and its subpages will be the hub for the following Advanced GIS courses offered through Watershed Sciences:

- WATS 4930/6920 - Advanced GIS & Spatial Analysis (2 credits) - 10 weeks
- WATS 4931/6921 - GIS Research Projects (2 credits) - 10 weeks
- WATS 6915 - GIS Fundamentals (2 credits) - 10 weeks

Syllabus Topics

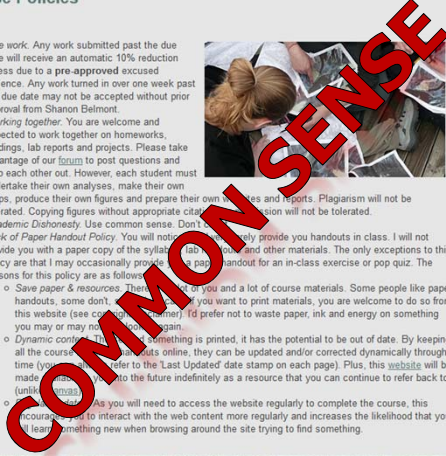
- Alternative or Follow-Up Courses
- Catalog Description
- Course Policies
- Format
- Grades
- How to Register (Spring 2012)
- Instructors
- Meeting Times & Place
- Primary Learning Outcomes
- Software
- Text & Readings

WATS 4930

COURSE POLICIES

- Just be respectful of your peers
- Turn off your phones
- No texting in lectures
- Laptops fine for notes/demos

About the Courses (Syllabi) >
Course Policies



- Lab work: Any work submitted past the due date will receive an automatic 10% reduction unless due to a pre-approved excused absence. Any work turned in over one week past the due date may not be accepted without prior approval from Shannon Belmont.
- Working together: You are welcome and expected to work together on homeworks, readings, lab reports and projects. Please take advantage of our forum to post questions and help each other out. However, each student must undertake their own analyses, make their own maps, produce their own figures and prepare their own notes and reports. Plagiarism will not be tolerated. Copying figures without appropriate citation and misrepresentation will not be tolerated.
- Academic Dishonesty: Use common sense. Don't cheat. I will not provide you with a paper copy of the syllabus or other materials. The only exceptions to this policy are that I may occasionally provide a paper handout for an in-class exercise or pop quiz. The reasons for this policy are as follows:
 - Save paper & resources: There is a lot of you and a lot of course materials. Some people like paper handouts, some don't. If you want to print materials, you are welcome to do so from this website (see copyright notice). I'd prefer not to waste paper, ink and energy on something you may or may not use again.
 - Dynamic content: If something is printed, it has the potential to be out of date. By keeping all the course materials online, they can be updated and/or corrected dynamically through time (you will see the Last Updated date stamp on each page). Plus, this website will be made available into the future indefinitely as a resource that you can continue to refer back to (unlike a printed syllabus).
 - Accessibility: As you will need to access the website regularly to complete the course, this encourages you to interact with the web content more regularly and increases the likelihood that you will learn something new when browsing around the site trying to find something.

TODAY'S PLAN

- I. Introductions
- II. Syllabus**
 - I. Primary Learning Outcomes
 - II. Topics
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gis.joewheaton.org/about

ADVANCED GIS COURSES
WATS 4930/4920, 4931/4921, 4915

About the Courses (Syllabi)

This page and its subpages will be the syllabi for the following Advanced GIS courses offered through Wheaton University:

- WATS 4930/4920 - Advanced GIS & Spatial Analysis (2 credits) - 10 weeks
- WATS 4930/4920 - GIS Research Program (2 credits) - 10 weeks
- WATS 4931 - GIS Fundamentals (1 credit) - 5 weeks
- WATS 4921 - GIS Fundamentals (1 credit) - 5 weeks

Which Course(s) Should I Take?

WATS 4930/4920 is what you should take if you want to get a comprehensive understanding of GIS and advanced spatial analysis. (GIS 4930/4920 is a prerequisite for WATS 4931/4921.)

WATS 4931 is the first four weeks of WATS 4930/4920. This course is designed for graduate students who want a more concise yet effective introduction to GIS. You don't have the time or need for the full 10-week course. The year 4931 experience is necessary, but the year is water. You will still be required to attend in person to make sure you have the best of both worlds. (WATS 4931 is a prerequisite for WATS 4930/4920.)

WATS 4920/4921 is a two-week follow-on course to WATS 4930/4920, which gives the skills and provides training in Advanced GIS & Spatial Analysis and practice through student research projects. WATS 4920 is available for students with a Graduate Research Assistant. Students will prepare a poster to present a project related to their research.

Syllabus Topics

- Alternative or Follow-Up Courses
- Catalog Description
- Course Policies
- Format
- Grades
- How to Register (Spring 2012)
- Instructors
- Meeting Times & Place
- Primary Learning Outcomes
- Software
- Text & Readings

GRADES

Grade Overview

Our primary concern is that you engage in achieving the [learning objectives](#) for this course. Your grade is a secondary concern to us, and if you are effectively learning your grade should be a moot point. However, we recognize how motivated some of you are by grades and we have attempted to provide clear guidelines (below) to help manage your expectations about what you need to do to earn the grade you want.

WATS 4930/6920

Your grade consists of lab-based work, a project and occasional quizzes (see [assignments](#)):

- 11 [Lab](#) Reports (2%-10% each) 95%
- Occasional Quizzes (Some in class and some on [Canvas](#)) 5%

* There are 10 scheduled [labs](#) and one self-paced labs.

WATS 4931/6921

Your grade consists entirely of lab-based works and outputs related to a final project (see [assignments](#)):

- [Project](#) 100%

WATS 6915

Your grade consists of lab-based work and occasional quizzes (see [assignments](#)):

- 4 [Lab](#) Reports (2%-10% each) 100%

Grading Scale

We will use a standard grading scale:

Grade	% of Available Points
A+	> 97%
A	< 97% to 93%
A-	< 93% to 90%
B+	< 90% to 87%
B	< 87% to 83%
B-	< 83% to 80%
C+	< 80% to 77%
C	< 77% to 73%
C-	< 73% to 70%
D+	< 70% to 67%
D	< 67% to 63%
D-	< 63% to 60%
F	< 60%



gis.joeheaton.org/about/grades

WATS 4930

TODAY'S PLAN

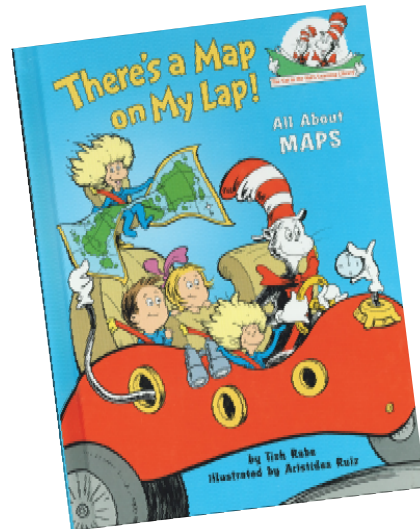
- I. Introductions
- II. Syllabus
- III. Review of Maps**
- IV. Questions/Summary



WATS 4930

EVERYTHING YOU NEED TO KNOW TO GET AN A

- A highly recommended text... \$8.99
- If for nothing else, impress your folks

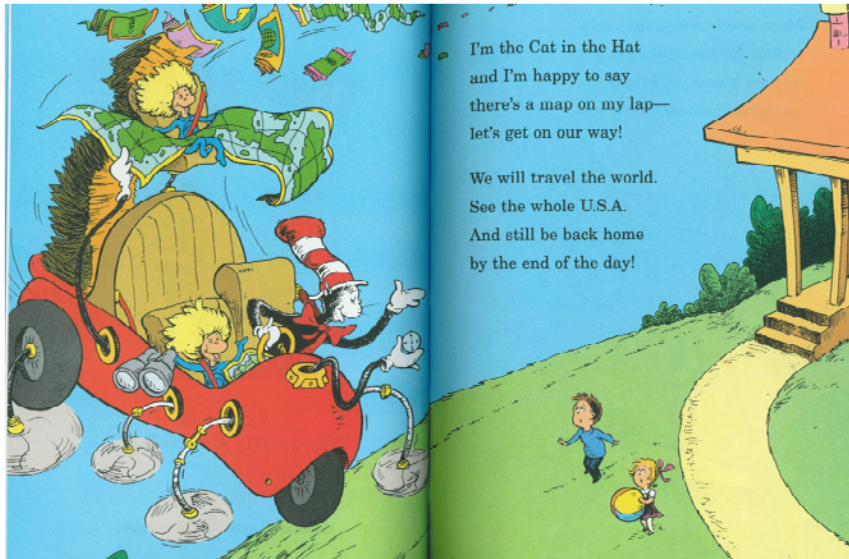


HE CAN'T BE SERIOUS... THIS IS A SENIOR / GRADUATE LEVEL CLASS!

- I am...
- Maps are the ultimate end product of GIS and GIS analyses
- GIS makes it easy to make maps
- Making *good* and *effective* maps is an art that is being lost (i.e. cartography)
- You intuitively know this... but you probably forgot



LET'S REFER TO THE CAT IN THE HAT



WHAT ARE MAPS? ALL HAVE A PURPOSE

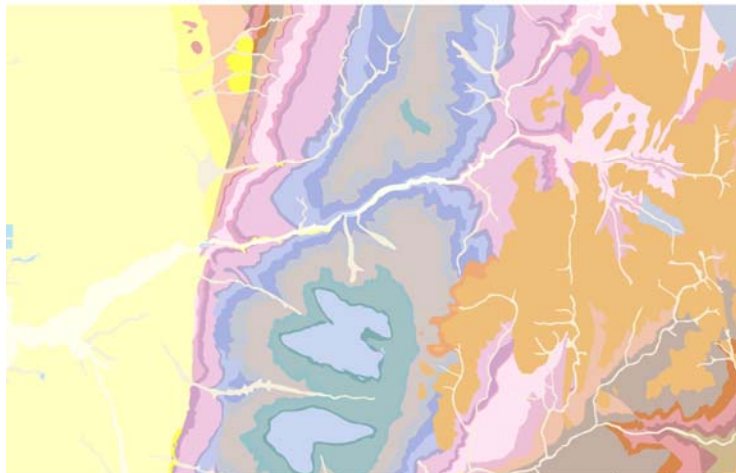


ALL MAPS HAVE A PURPOSE

- What point is the map trying to convey?
- Context helps convey that point

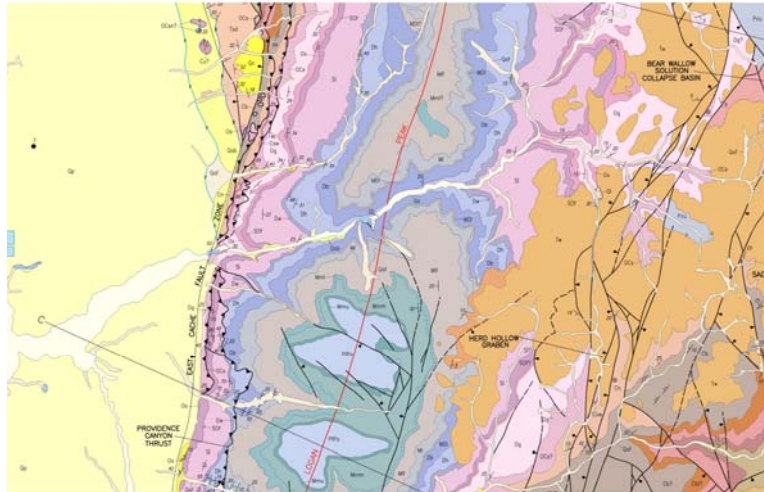
The Map	Example Purpose
Location Map	Show the location of something within a broader geographic context of common knowledge to audience (e.g. state, country, world)
Geology Map	Show spatial distribution of underlying geology
Habitat Map	Show spatial distribution of different habitat types
Topographic Map	Show spatial distribution of elevations
Watershed Map	Show delineated boundary of watershed
Election Map	Show which areas voted for which candidate

A GEOLOGY MAP: JUST GEOLOGY...



A GEOLOGY MAP: MORE VECTOR DATA

A Portion of the Geologic Map of the Logan 30' x 60' Quadrangle

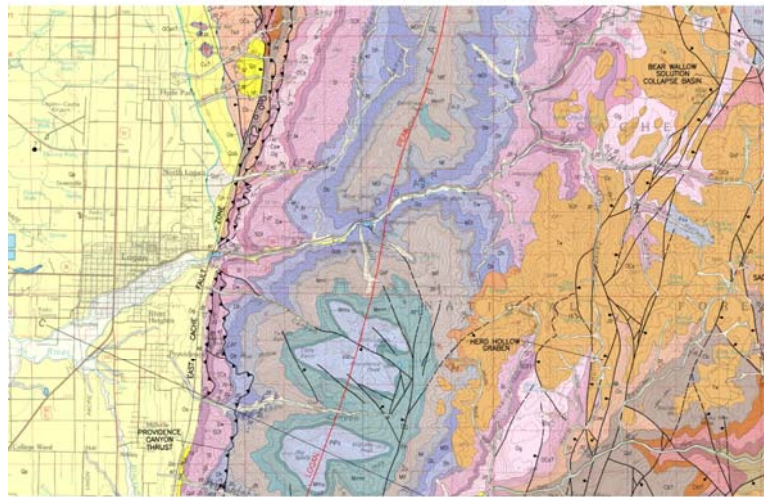


Data from Utah Geological Survey: <http://geology.utah.gov/>

WATS 4930

A GEOLOGY MAP: ADD DRG USGS BASE

A Portion of the Geologic Map of the Logan 30' x 60' Quadrangle

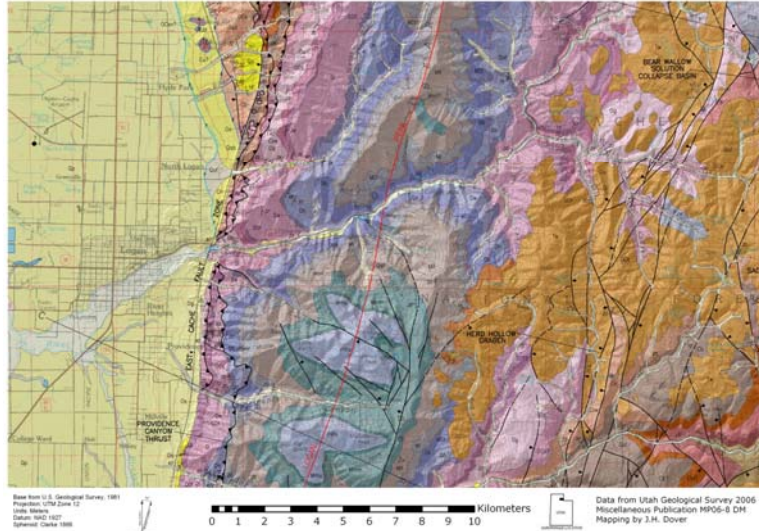


Data from Utah Geological Survey: <http://geology.utah.gov/>

WATS 4930

A GEOLOGY MAP: ADD HILLSHADE RASTER

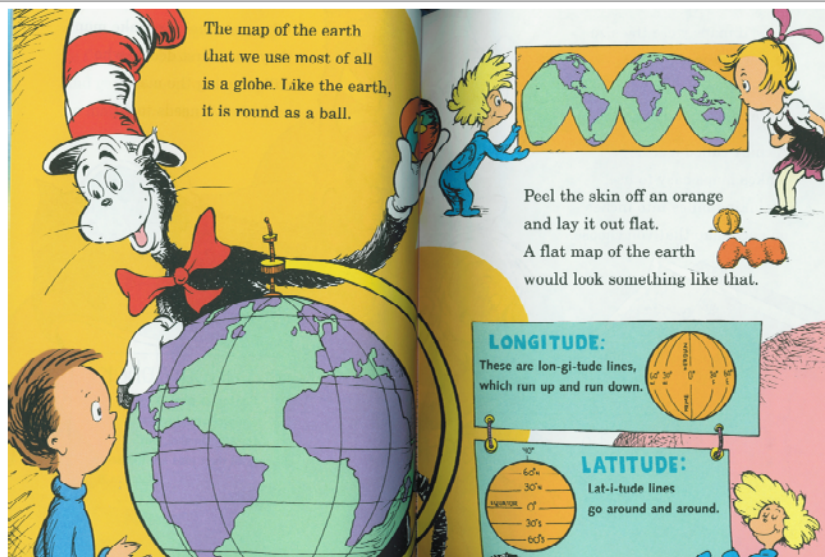
A Portion of the Geologic Map of the Logan 30' x 60' Quadrangle



Data from Utah Geological Survey: <http://geology.utah.gov/>
 Topographic Data from: <http://gis.utah.gov/>

WATS 4930

PROJECTIONS, LAT & LONG

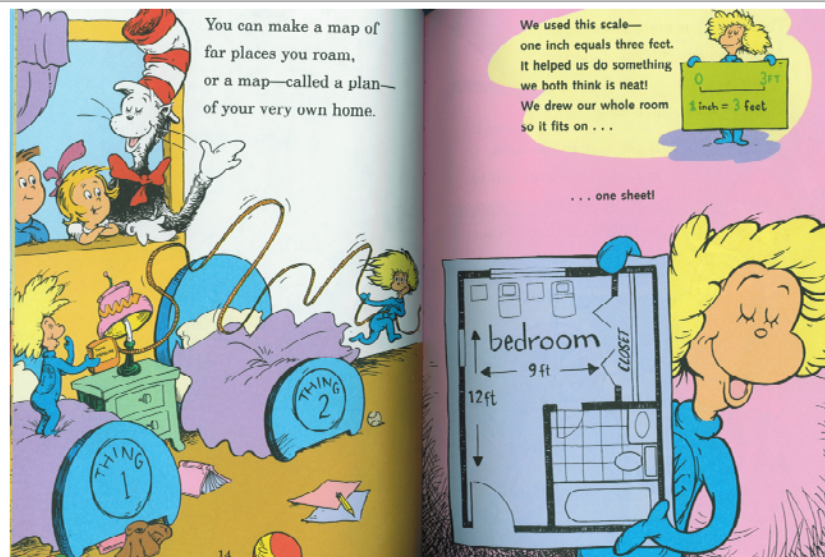


WATS 4930

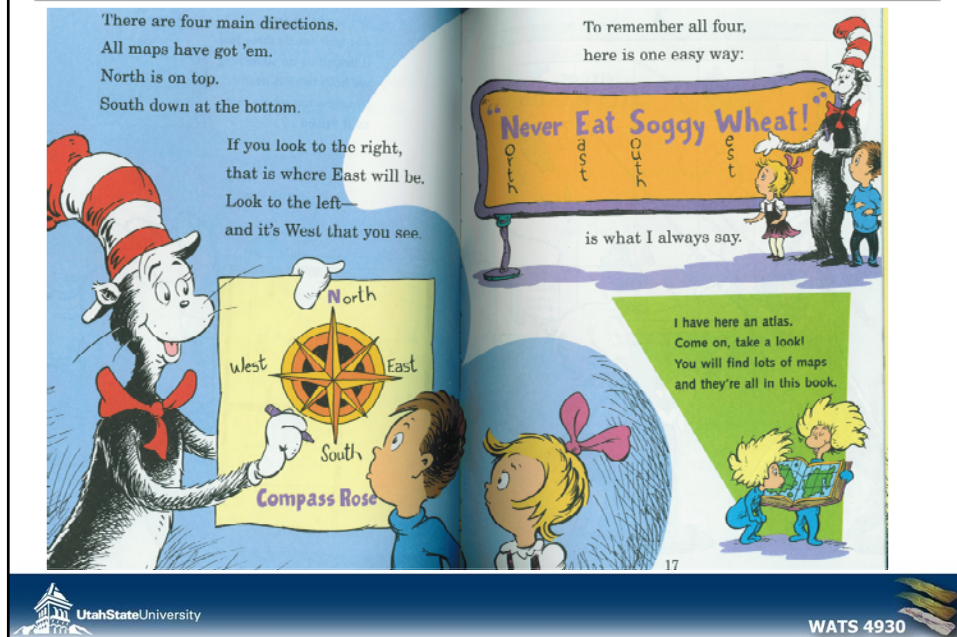
SCALE



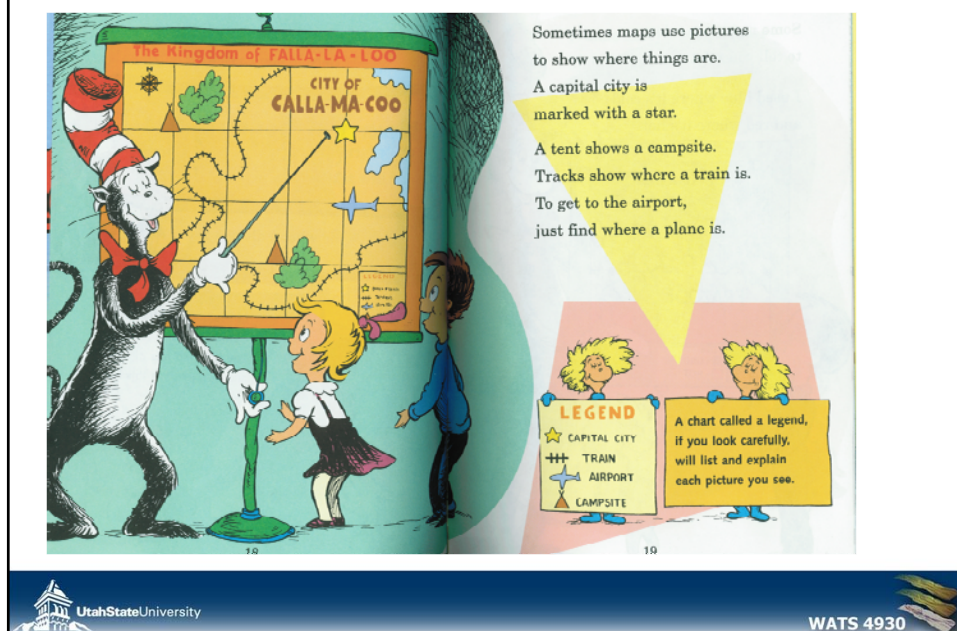
SCALE & PLANS



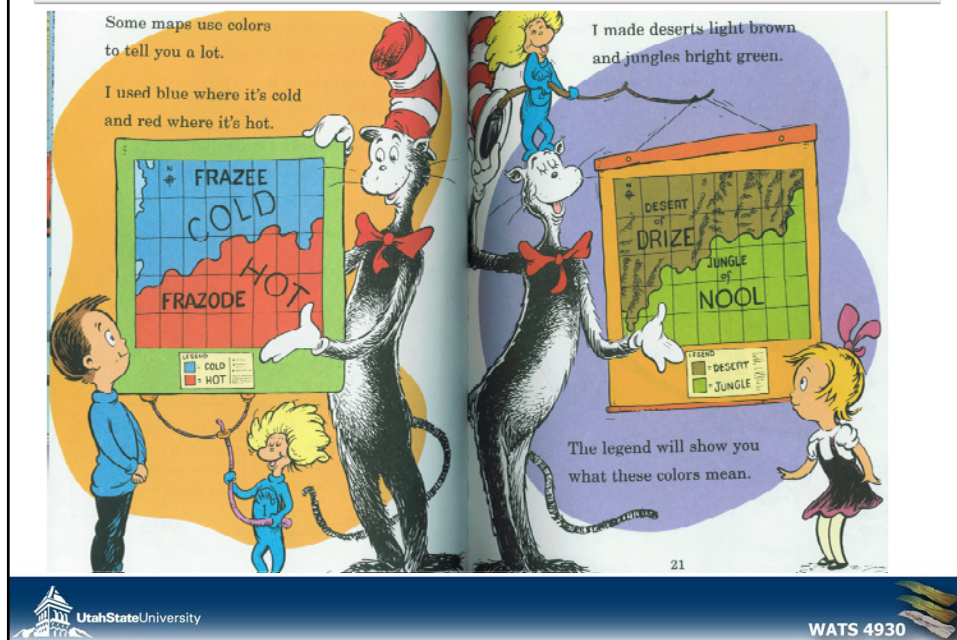
DIRECTION / ORIENTATION



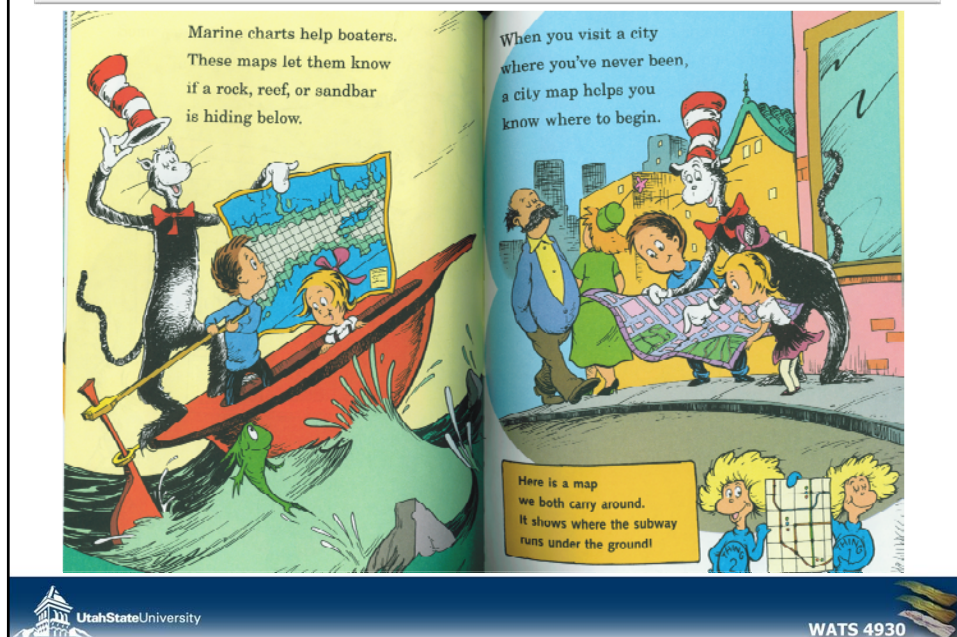
LEGENDS & SYMBOLOGY



SYMBOLGY – COLORS & HATCHES



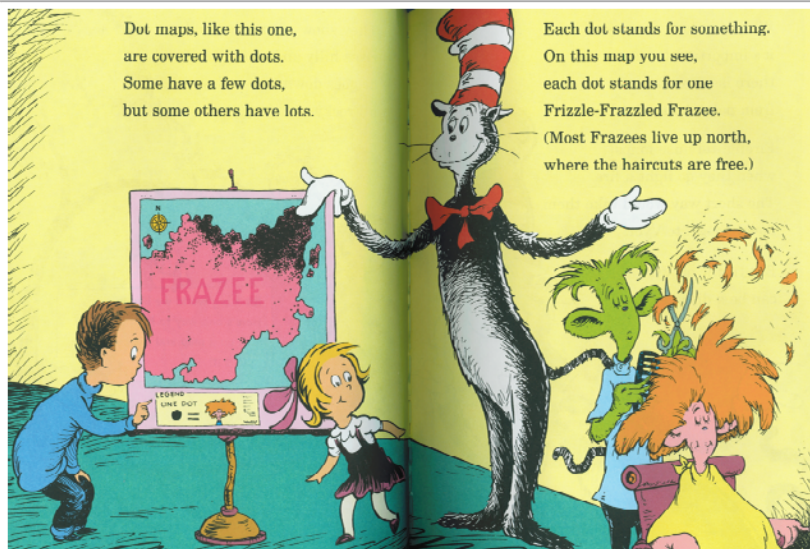
SYMBOLS, LINE-TYPES, ABSTRACTIONS



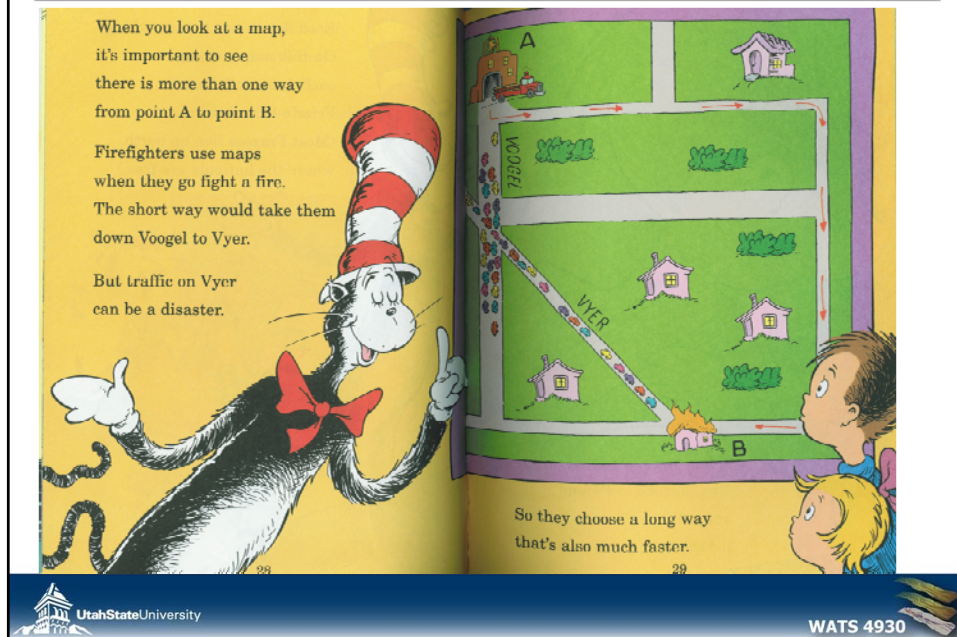
TOPOGRAPHIC MAPS



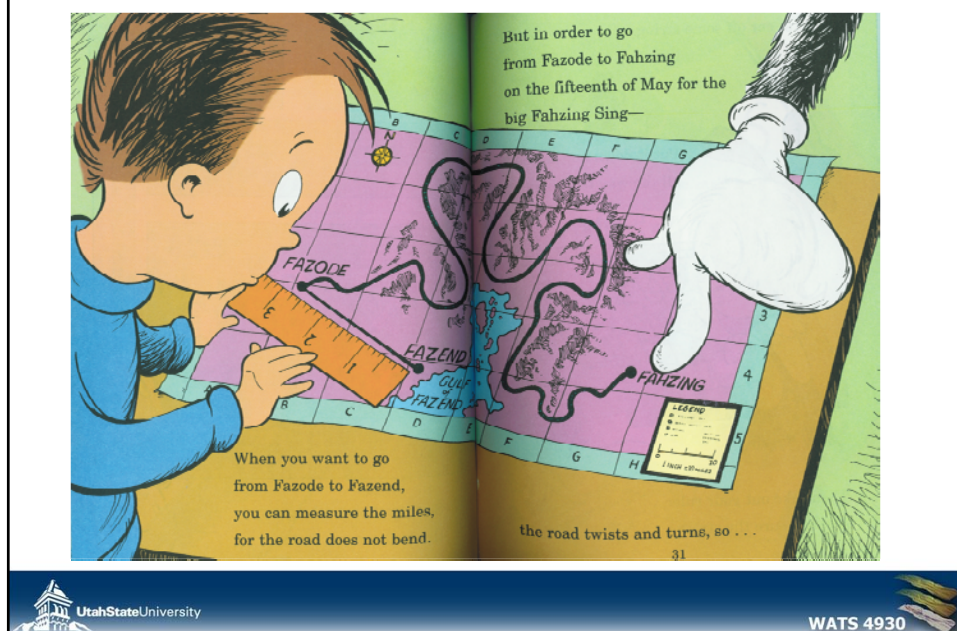
SYMBOLIC REPRESENTATION



ROUTE ANALYSES (MIN. COST)



MEASUREMENT QUERIES



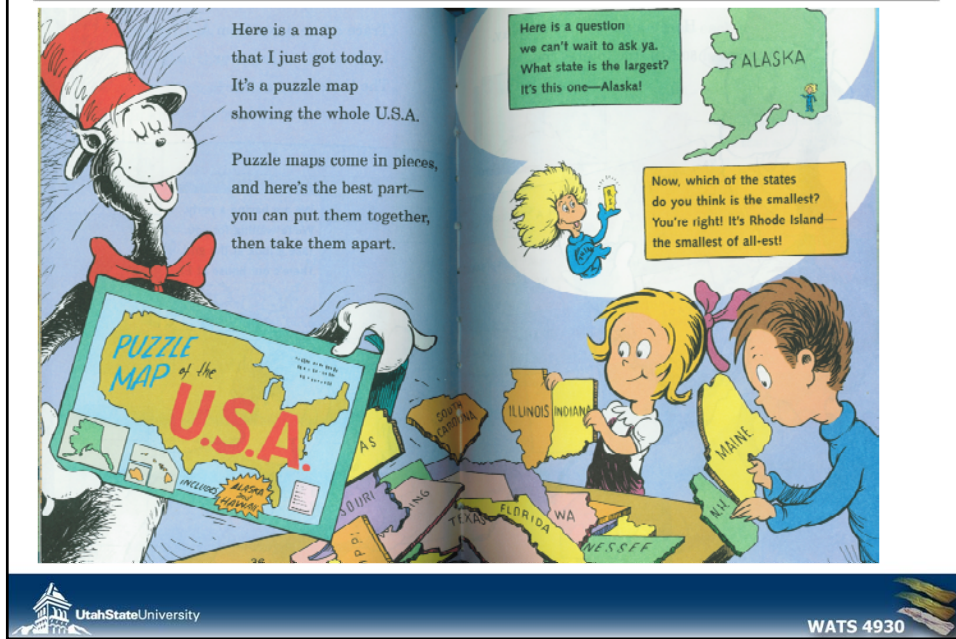
THE EVER RELIABLE STRING TECHNIQUE



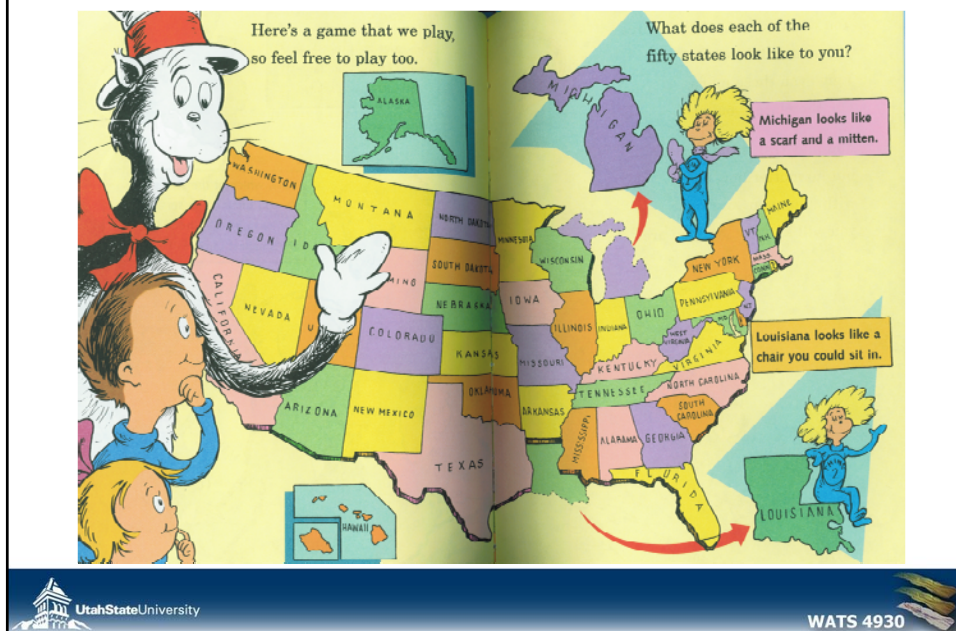
GRID REFERENCES & COORDINATES



SOLVING PUZZLES WITH MAPS



PATTERN RECOGNITION



ISN'T THAT NICE?



EVEN HAS A GLOSSARY

GLOSSARY

Capital: A city where the government of a state or country is located.

Cartographer: A person who makes maps.

Equator: An imaginary line that circles the middle of the earth between the North and South Poles.

Globe: A representation of the earth in the shape of a ball.

Grid: A pattern of lines on a map usually running north-south and east-west that is used for giving positions.

Latitude: Imaginary lines on the earth that run east and west, parallel to the equator.

Legend: The part of a map that lists and explains the symbols, colors, and scale used for the map.

Longitude: Imaginary lines on the earth that run north and south and meet at the poles.

Map: A flat representation of the earth or a part of the earth that shows the relative position of places.

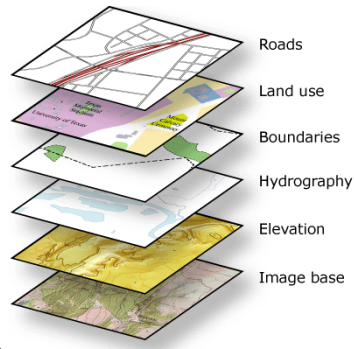
Scale: The relationship between the actual size of an area and its size on a map.

Symbol: A sign or drawing that stands for something else.

Topographical map: A map that shows the shape and changing elevation of the land's surface.

WHY SHOULD YOU CARE?

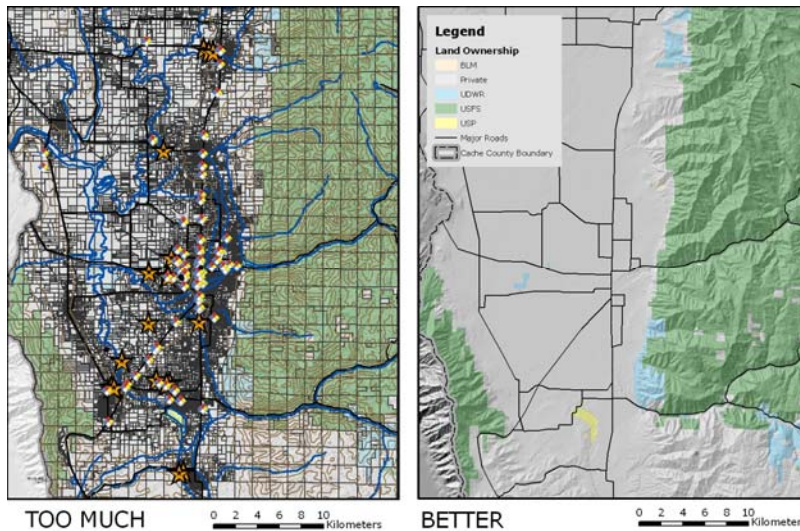
- Making bad maps is easy with GIS!
- You need to know how to speak the language (i.e. nomenclature and terminology matters)
- You need to understand the spatial analyses you perform
- We're going to grade you based on the Cat and the Hat and the 6 C's



THE 6 C's TO EARN BETTER THAN A C

- Colorful (but not cluttered)
- Creative (but not confusing)
- Consistent
- Context (location, coordinates, scale, orientation, setting)
- Convincing (fit for purpose)
- CORRECT

TOO MUCH OVERLAY....



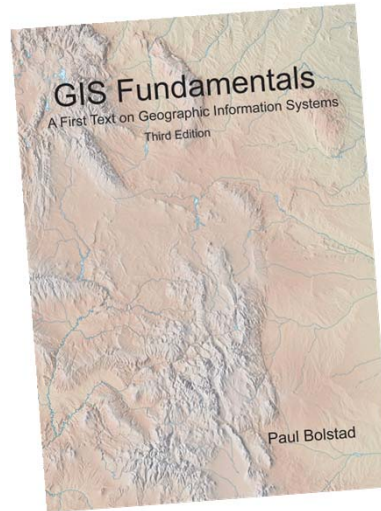
TODAY'S PLAN

- I. Introductions
- II. Syllabus
- III. Review of Maps
- IV. Questions/Summary**

READING FOR THURSDAY

Reading Assignments will always be posted on the course website...

- I will try to highlight reading for you at the end of most lectures
 - Read Chapter One of Bolstad: "An Introduction to GIS"
- In general, you should get in the habit of checking the website. For this Thursday, see:
 - <http://gis.joewheaton.org>



THURSDAY'S READING/HOMEWORK:

GIS Classroom

- Home
- About the Courses (Syllabi)
 - Grades
 - Instructors
 - Primary Learning Outcomes
 - Software
- Course Topics
- Assignments
 - Labs
 - Project (4931/6921)
 - Reading Assignments
- Class Announcements
- Class Calendar
- Great Maps!
- Class Forum
- GIS Class LibGuide
- Help
- © 2011 - Disclaimer & Copyright

Utah State University Links

- Canvas (Submit Assignments)
- Department of Watershed Sciences
- Banner Access
- Current Students
- Prospective Students
- Open Course Ware

Assignments > Reading Assignments >

Required Reading & Tasks for January 12th

posted Jan 6, 2012 6:54 AM by Joe Wheaton [updated Jan 6, 2012 6:55 AM]

All of the following nine tasks are considered your homework and should be completed by **Thursday, January 12, 2011** (before lecture):

1. Read Chapter One of [Bolstad \(2005\)](#)
2. Browse & become familiar with organization of [Course Website](#)
3. Confirm that you have [Canvas](#) access - You'll need this for submitting assignments
4. Register as a user for the [Class Forum](#) - You'll need this for posting and answering questions
5. [Register as a new user for the Quinney Lab](#) - You'll need this for access to lab computers
6. If you do not already have an ESRI Global Account, go to [ESRI Support](#) and follow the Create New ESRI Account link. ALSO, log into [ArcGIS.com](#) and register your global ESRI account for access to ArcGIS Online (see [here](#) if confused) - You'll need this for posting to ESRI's discussion forums, subscribing to alerts, and making online maps with ArcGIS Online.
7. Install [ArcGIS](#) on your own machine (if you have one)
8. If you do not already have a Google [Gmail account](#) (not your Aggiemail account), create one. - You'll need this for creating your Google Sites website and making Google Maps.
9. Make sure you have a secure means of remembering all these different usernames and passwords (e.g. [LastPass](#)). For this class alone, you will have need to regularly use the following credentials:
 - o USU Banner strong ID & Password for [Canvas](#) & [Banner](#)
 - o Quinney Lab - (uses your A number as username, but has a different password)
 - o [Class Forum](#)
 - o [Gmail](#)
 - o [Esri Support](#) and [ArcGIS.com](#)

THIS WEEK'S LAB

Introduction

- Lab 01 – ArcGIS Refresher & Intro to WebGIS
 - You'll make a very basic map in ArcGIS just to get you used to working in ArcGIS again ;)
 - You will create a website that will be the repository for ALL of your lab assignments
 - You will publish your map and build an interactive google map on your website...



Everything you need:

<http://gis.joewheaton.org/assignments/labs/lab01>

NEXT LECTURE

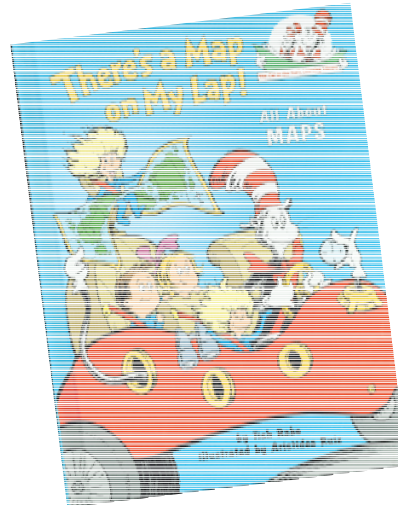
On Thursday:

- Detailed Review of GIS & Intro to WebGIS



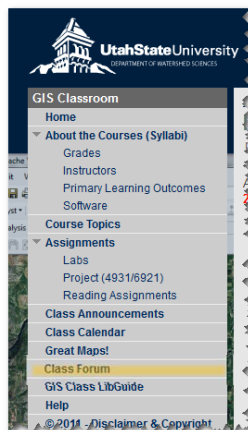
TODAY'S SUMMARY

- Nice to meet you...
- Syllabus is on <http://gis.joewheaton.org>
- Cat in the Hat and excellent reference
- 6' C's to avoid a C



QUESTIONS??

- Post other questions to our Class Forum at <http://forum.bluezone.usu.edu/gis>



phpBB GIS - WATS 4930 & 6920 Class Discussion Boards

Board index

Board index

Board index

	posts	views	last post
General Logistics Questions	14	78	Su Wednesday 12 Thu Mar 20, 2014 2:15 pm
Lab 01 - ArcGIS Desktop & Intro to Maps	11	41	Su Monday 12 Thu Mar 20, 2014 2:47 pm
Lab 02 - Transformations & Projections	6	6	No posts
Lab 03 - Reproducing Maps - Geologic Maps	19	47	Su Monday 12 Thu Mar 20, 2014 3:03 pm
Lab 04 - Digitizing, Editing & Sharing Data	16	59	Su Monday 12 Thu Mar 20, 2014 11:40 am
Lab 05 - Vector Analysis	1	24	Su Wednesday 12 Thu Mar 20, 2014 11:40 am
Lab 06 - Working with DEMs	12	71	Su Wednesday 12 Thu Mar 20, 2014 11:40 am
Lab 07 - Building Maps	3	4	Su Wednesday 12 Thu Mar 20, 2014 9:08 am
Lab 08 - Morphometric Analysis	1	26	Su Wednesday 12 Thu Mar 20, 2014 9:08 am
Lab 09 - Georeferencing	20	74	Su Wednesday 12 Thu Mar 20, 2014 11:40 am
Lab 10 - Mosaic & Georeferencing	1	3	Su Wednesday 12 Thu Mar 20, 2014 11:40 am
Lab 11 - Georeferencing with your Projects	3	4	Su Wednesday 12 Thu Mar 20, 2014 11:40 am