SSCI 581 – Concepts for Spatial Thinking (Section 35745)
Course Syllabus Spring 2013

Instructor: Lecturer Katsuhiko "Kirk" Oda
Location: AHF B55J
Email: katsuhio@usc.edu
Website: gis.usc.edu, spatial.usc.edu
Adobe Connect: http://usccollege.adobeconnect.com/katsuhio

Office Hours: (tentative) Monday – Friday 10am to 2 pm Pacific Time
Always available asynchronously via email. Also, available for synchronous chats via phone or Skype or Adobe Connect, audio or video most days and times *by prior arrangement* via email. Just get in touch!

Course Scope and Purpose

This course is designed as an introduction to GIS, and more importantly, to the cartographic and spatial concepts underlying GIS. It is the entrée course for both the GIST Certificate and the GIST Master of Science degree program. This is also a good course for those who are considering getting more seriously involved with GIS and want to first understand the underlying concepts. In this course, you will gain an understanding of the basic concepts of cartography, working with spatial information, GIS, and ArcGIS. We will cover several topics:

Maps for communicating geographic information – We start by focusing on basic concepts that are fundamental to understanding the nature of geographic knowledge, how this knowledge is communicated, and how it can be graphically depicted.

Spatial thinking and spatial concepts – As an important foundation to understanding the scope and possibilities of using GIS to represent and manage the world around us, we examine some basic notions of cognition, mental representations of space, meaning in maps, spatial thinking and spatial problems.

Fundamentals of GIS – Of course, most of the term will concentrate on the fundamentals of our field. Here we consider the nature of computer systems for handling geographically referenced data. We explore the nature of geographic data and some basic ways to analyze it. You will get a structured hands-on introduction to the most widely used GIS software, Esri's ArcGIS. We will also review the history and development of GIS, the costs and disadvantages of GIS and likely future developments.

Learning Outcomes

When you have completed this course, you will be able to:

- Explain how spatial thinking is one of the basic human intellectual processes and what roles it plays in our everyday lives.
- Describe how spatial concepts enable maps to become powerful communication tools.
- Define Geographic Information Science (GISci) and explain how it forms the basis of Geographic Information Systems (GIS), and how it is relevant to various other scientific disciplines;

- Explain how Geographic Information Systems are powerful tools enabling spatial thinking and describe how spatial concepts define how this technology is implemented and used;
- Name and explain the components that make up a Geographic Information System;
- Describe how geospatial data models are used to represent geographic phenomena, and evaluate the appropriateness of each model for specific applications of GIS;
- Explain the purpose and operation of the most commonly used spatial operations in GIS, and evaluate the constraints placed on their use by specific data types and models;
- Use ArcGIS to find, input and explore geospatial data, to perform basic analytical procedures and to produce a simple thematic map.

Course Formats

This is a graduate level course, so you should expect this class to be both academically robust and intellectually challenging. As graduate students you are expected to engage with the information you are learning and to explore the heady cauldron of ideas, opinion, and analysis that describe our collective effort to thoroughly interrogate the subject at hand. Learning arises from active engagement with the knowledge found in our reading materials and with one another. As in any graduate class, the instructor's role is that of a guide who keeps you on this path of discovery and you will find that you will learn much from your fellow classmates. The challenge for us is to replicate such an academic experience within the milieu of "distance learning".

All course materials will be organized through Blackboard. The main theoretical concepts will be provided through course notes and assigned readings. Hands-on practical exercises will use various software products accessible over the Internet. Assignments will give students an opportunity to internalize and apply the concepts and theory learned from readings. Some assignments require student interaction, all will benefit from it.

We have several technologies that will facilitate our course work and our interactions, despite our dispersed locations. These include:

Blackboard – All course materials and correspondence will be posted on the course Blackboard site. As a registered student you'll find this course will show up in your available courses at noon Pacific Time on the first day of classes. It is here that the day-to-day flow of the course will be recorded.

Discussion boards and blogs – On the Blackboard site, we'll post a number of discussion threads relevant to various sections of the course. These are vitally important when we get to the hands-on work as we expect students to work "together" on these exercises, sharing hints and help as you would do in a common laboratory classroom. Other discussion threads are to be used to organize asynchronous discussions for all of you, the students. **These threads are mainly meant to be a forum for student-to-student discussion and collaboration. I may not be following these threads, so don't expect a quick answer if you decide to pose a question for me in these threads. Rather, if you want me to be involved you will need to shoot an email for me to do so.**

Live meetings and presentations - At USC, we use a browser-based service called Adobe Connect to create synchronous interaction sessions. With voice and webcam capabilities Adobe Connect can be used to share presentations and even our desktops between two or more people.

Individual meetings - While Adobe Connect can be used for one-on-one meetings, we generally find it's easier to use the free VOIP and chat technology, Skype (www.skype.com) for individual chats.

Assessments

Your grade in this class will be determined on the basis of several different kinds of assessment. Each week, by Monday, we'll post a Weekly Assignment outlining the work you are expected to complete that week with the relevant due dates. Most submissions will be due on the **Tuesday** following the week in which they are assigned.

Readings Homework – 8 for a total of 30 points. These will focus on the theory portion of the course as presented in the weekly readings. Their objective is to help you evaluate and integrate the information you have acquired from the course readings. Some of these will involve discussions and collaborative work, some will be individual efforts, one early in the term will involve a one-on-one presentation to the instructor. *Late submissions will be docked one grade. No grade will be given for assignments turned in over one week late.*

Tutorials – 6 for a total of 40 points. Most weeks you are expected to work through one or more chapters in the ArcGIS Tutorial 1 workbook. To demonstrate that you have completed each chapter assigned, you will turn in brief text answers or a quick copy of some digital output from the final part of the exercise such as a .jpg of the map produced at the final step or. In order to demonstrate that you understand the basic ArcGIS skills learned in the workbook, you will also complete one hands-on assignment that will take independent thought. These are graded on a credit/no credit basis, *with no credit given for late submissions.*

Final Project – 4 components for a total of 30 points. The Final Project is your opportunity to integrate all that you have learned in the semester. In the Final Projects you will:

1. Frame a site suitability question.
2. Collect appropriate spatial and non-spatial data.
3. Import data into ArcGIS.
4. Execute the site suitability analysis using your imported data and ArcGIS.
5. Produce a map that demonstrates the result of your site suitability analysis.

You are expected to answer your site suitability question and to prepare one or more maps that illustrate the results.

The Final Project will have 4 components:

1. Proposal (5 points) – one paragraph description of the site suitability question (300 words)
2. Data report (5 points) – a report on the data acquired for the project (as long as needed, requirements provided in the project instructions)
3. Presentation (5 points) – consists of 3 text slides presenting: the site suitability question; a description of how the site suitability analysis might be conducted; issues encountered while completing the project; and one or more slides showing your maps created to illustrate the question.
4. Final report (15 points) – due within 1 week of the presentation to allow time for final revisions (1500-2000 words plus map(s)).

Requirements

Textbooks – The following two books are required for this course. They are available from the USC Bookstore or online outlets such as Amazon.com. Be sure to order your textbook to arrive by the fastest method possible as you will need them immediately.

- Bolstad, Paul, 2012. GIS Fundamentals: A First Text on Geographic Information Systems, Fourth Edition, White Bear Lake, MN: Eider Press.
- Gorr, Wilpen L., and Kurland, Kristen S., 2011. GIS Tutorial 1: Basic Workbook, Fourth Edition, Redlands, CA: Esri Press. (*referred to in this course as GTW)*

For those of you in SSCI 587 as well this term, you'll note that the Bolstad text will be used in that course, too. In this course, the textbooks will be supplemented with the Course Notes and a mixture of readings from academic journals, professional reports and authoritative websites.

Readings - The following Readings are required for this course, and are provided either as pdf's or through links on the course Blackboard.

Batty, M., A. Hudson-Smith, R. Milton and A. Crooks (2010) Map mashups, Web 2 and the GIS revolution. *Annals of GIS* 16:1(1-13).

Dangermond, J., (2011) A New Geospatial Modality - Interview with Jack Dangermond. *Geospatial World.* http://www.geospatialworld.net/media/Interview_Jack-Dangermond.pdf.

Downs, R.M. (1997). The geographic eye: Seeing through GIS? *Transactions in GIS*, 2(2), 111-121.

Goodchild, M.F. (2006) The Fourth R? Rethinking GIS Education. *ArcNews Online* Fall 2006. http://www.esri.com/news/arcnews/fall06articles/the-fourth-r.html.

Kimerling, A. Jon, A.R. Buckley, P.C. Muehrcke, and J.O. Muehrcke (2012) Map Use: Reading and Analysis, Seventh Edition. Redlands, CA: *Esri Press*. Foreword and Introduction.

Kitchin, R., and M. Dodge (2007) Rethinking maps. *Progress in Human Geography* 31:3(331-34).

Kumar, S., (2011) Geospatial industry: Here today, world tomorrow. *Geospatial World.* http://www.geospatialworld.net/index.php?option=com_content&view=article&id=21415.

Mitchell, A., (2012) The Esri Guide to GIS Analysis Volume 3: Modeling Suitability, Movement, and Interaction. Chs 2 and 3. Redlands, CA: Esri Press.

National Research Council, (2006) Learning to Think Spatially. Chs 1, 2, and 3. Washington, DC: *National Academies Press.* http://www.nap.edu/catalog.php?record_id=11019 (click "Download free PDF" button – you don't need to pay).

The Road Ahead for ArcGIS: Cloud Services, Hosted Map Content, and the New Runime at ArcGIS 10.1. ArcNews, Summer 2011. http://www.esri.com/news/arcnews/summer11articles/the-road-ahead-for-arcgis.html

Virrantaus, K., D. Fairbairn and M-J Kraak (2009) ICA Research Agenda on Cartography and GI Science. *The Cartographic Journal* 46:2(63-75).

Technology – There are several technology requirements:

- ArcGIS is provided on-line via the GIST Server, you do not need to install it on your own computer.
- Every student must have a computer with a fast Internet connection (DSL at a minimum). Since we now serve the key software from the Server, you can use either a Mac or a PC.
- Every student MUST have a functional webcam for use whenever a presentation or meeting is scheduled.

Communications – This is a distance learning course, so most of our interactions will be asynchronous (not at the same time). All materials to be handed in will be submitted via the Blackboard Assessment link. I will also create at least one Blackboard (BB) discussion forum at the start of the semester and I may create and/or monitor additional BB discussion forums through which you can discuss course-related topics as well as assist each other with comments on the course assignments, exercises and projects as the need arises.

I will send via email through Blackboard any notices that are time sensitive. Please be sure that you read as soon as possible all email sent from Blackboard or from me. Also double check to be sure that mail sent from both the USC blackboard accounts and my email (katsuhio@usc.edu) does not go into your junk mail!

While I am usually on-line and will probably respond to emails from students very quickly, I will endeavor to respond to all email within 24 hours of receipt, aiming for no more than 36 hours delay. In the rare case when I expect to be off-line for more than 24 hours, I will post an announcement on the Blackboard site.

Your responsibility: It is each student's responsibility to stay informed about what is going on in our course. In addition to email about time-sensitive topics, any important announcements will be posted on the Announcement page in Blackboard. Be sure to check these each time you log onto Blackboard.

Workload – This is a four credit, one semester course. Students should expect to spend 10-12 hours per week completing the work in this course.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. More information about academic accommodations based on a disability can be found at: http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to an instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using

another's work as one's own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions can be found at: http://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/.

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

Important Administrative Dates

1/14: Spring semester classes begin
1/21: Martin Luther King Day, university holiday
2/1: Last day to register and add classes
2/1: Last day to drop a class without a mark of "W" and receive a 100% refund
2/18: Presidents' Day, university holiday
3/18-23: Spring recess
3/25: Deadline to submit signed Approval to Submit form to the Graduate School**
4/1: Deadline to upload thesis or dissertation manuscript**
4/12: Last day to drop a class with a mark of W
5/3: Spring semester classes end
5/4-7: Study days
5/15: Final Examinations end
5/17: Commencement

http://www.usc.edu/academics/classes/term_20131/calendar.html
http://www.usc.edu/schools/GraduateSchool/current_thesis_dissert_03.html

Tentative Course Schedule (see next page)

In addition to the usual Wednesday (or Tuesday or Thursday, if a Wednesday is a holiday) due dates in the weeks beginning with the dates as indicated in the following table, the following special due dates have been set:

- Individual meetings during Week 5 - slots will be individually scheduled during the week of February 11. There will be presentation times on the weekend and during evenings to accommodate everyone's schedule.
- Presentation of final project Week 15 – slots will be individually scheduled during the week of April 15, extending over the weekend and into the following week.

Final project written report – due Wed. May 15, 5pm Pacific Time

Tentative Schedule

Week #	Week Begins	Theme	Week's Readings and Practice		Assessments	
			Reading	Hands-on ArcGIS Exercise	Homework **Due** this Week	Project **Due** this week
1	14-Jan	Introduction	1: Bolstad 1			
2	22*-Jan	Maps for communicating spatial information	2: Articles, Notes	Tutorial 1	Reading 1	
3	28-Jan	Representing geography in a computer	3: Bolstad 2, Notes		Reading 2	
4	4-Feb	Projections and Coordinate Systems	4: Bolstad 3,8, Notes	Tutorial 2	Tutorial 1	
5	11-Feb				Reading 3	Individual Meetings
6	19*-Feb	Spatial Thinking and Concepts	5: On-line chapter, Notes	Tutorial 3	Tutorial 2	
7	25-Feb				Reading 4	
8	4-Mar	Vector Analysis	6: Bolstad 9, Notes	Tutorial 4	Tutorial 3	
9	11-Mar				Reading 5	
	18-Mar	Spring Recess				
10	25-Mar	Raster Analysis	7: Bolstad 10, 11, 13, Mitchell 2,3, Notes	Tutorial 5	Tutorial 4	Proposal
11	1-Apr				Reading 6	
12	8-Apr	The history and future of GIS	8: Bolstad 15, Articles, Notes	Tutorial 6	Tutorial 5	
13	15-Apr				Reading 7	Data Report
14	22-Apr				Tutorial 6	
15	29-Apr					Presentations
**	6-May				Reading 8	
***	13-May					Final Report
	15-May	End of Term				

*Mondays Jan. 21 and Feb. 18 are university holidays.

**May 4-7 is listed as "Study Days" on the USC calendar.

***May 8-15 is listed as "Final Exams" on the USC calendar.