SSCI 587 – GPS/GIS Field Techniques (Section 35760D)
Course Syllabus – Spring Semester 2013

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    I am always available asynchronously via e-mail. I am also available for synchronous chats via phone or Skype or IM text, audio or video most days and times *by prior arrangement* via e-mail. Or we can meet in my Adobe Connect room. Just get in touch!

Course Scope and Purpose

This course is a required course for both the GIST Graduate Certificate and the GIST Master of Science degree programs and provides students with the requisite knowledge and practical skills to source and evaluate, against recognized quality standards, data for use in GIS-based projects and assess the quality of information output from those projects. We will cover several topics:

Data needs and types – We start by focusing on the data problem (challenge!), defining data needs, and the role of conceptualization, entitation, and quantification in scientific research and management, and an introduction to some of the ways in which spatial and attribute data can be gathered and used to serve specific needs.

Data sources – As an important foundation to understanding the scope and possibilities of using GIS to represent and manage the world around us, we examine techniques for data capture and the role of global navigation satellite systems, aerial and satellite images and various other kinds of digital data in GIS applications.

Types and sources of error – We discuss data standards and how they are used to promote and/or preserve data quality. We also examine the various types and sources of error that we may encounter as a part of the data stream that might be used for a specific project or application.

Data quality management and control – Here we consider the various ways in which we can check for errors and cope with uncertainty when using GIS to help inform the decisions and actions we may take to achieve one or more specific outcomes in the real world.

Field Work – This course also includes a field project on Catalina Island where students design, conduct, and present the results of their own GPS-based data collection projects. Please note that in addition to regular tuition cost, there is a room and board fee of $424 for the week long field trip to the Philip K. Wrigley Marine Science Center on Catalina Island.

Learning Outcomes

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

- Design and implement a strategy for capturing or sourcing geospatial data and any accompanying metadata;

- Assess the impact of national and international data standards on the sourcing and availability of geospatial data;
- Critically evaluate the potential impacts of data quality on spatial analysis and decision making;
- Specify fitness for purpose (i.e. use) criteria and apply them to the evaluation of geospatial data for specific applications

Course Formats

This 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-level 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 "online 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 – On the Blackboard site, we'll post a number of discussion threads relevant to various sections of the course. I may or may not participate in these threads but they 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. Additional discussion threads may be used to organize asynchronous discussions.

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 (http://www.skype.com) for individual chats.

Assessment

Your grade in this class will be determined on the basis of several different assessment tools:

Reading Assignments – 9 for a total of 18 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 and some will be individual efforts. These are graded on an A/B/C scale – A is excellent, B is good, C is not acceptable (and also not acceptable for graduate level work). Late assignments will be docked one grade. No grade will be given for assignments turned in over one week late.

GIS/GPS Assignments – 3 for a total of 15 points. The hands-on GIS assignments will require you to work through various skill development activities. To demonstrate that you have completed the steps comprising each of the assignments, you will submit a word document containing digital output and/or brief text answers from parts of the exercises such as a map. These are graded on a credit/no credit basis, no credit given for late assignments.

Exercises – 3 for a total of 9 points. In order to demonstrate that you understand the basic concepts and skills learned in the class, you will complete three exercises that will integrate key concepts and ideas and take some independent thought. During the weeks that Exercises are due, there will be no Reading or GIS assignments due.

Catalina Field Component – 3 for a total of 30 points. For this part of the class, you will be divided into a series of small teams and each team will deliver two oral presentations (one at the start of the week on what they plan to do and one at the end of the week summarizing their results and what did and did not work for them) along with a poster presentation summarizing their projects and the accompanying results. The posters must be submitted for grading (in electronic form) before leaving the island.

Research Papers – 2 for a total of 27 points. The first paper will provide you with an opportunity to describe the data capture options and challenges for a project of your choice from a list of projects spanning a variety of application domains and the final paper will afford you the opportunity to integrate all that you have learned in the semester for a specific application that I will designate when the guidelines for the final papers are distributed.

Requirements

Textbooks – There are two required texts for this course. They are available from the USC Bookstore or online outlets such as Amazon (http://www.amazon.com). We encourage you to purchase these books right away since you will need these materials from the opening day of class. Please note that the Wilson and Fotheringham book is available through USC Libraries as an e-Book, but it is recommended that you purchase this book as it contains information vital to GEOG 587 as well as other GIST courses.

- Bolstad, Paul, 2012. *GIS Fundamentals: A First Text on Geographic Information Systems,* 4th edition. White Bear Lake, MN, Elder Press (available at http://www.AtlasBooks.com).

- Wilson, John P. and A. Stewart Fotheringham (editors), 2008, *The Handbook of Geographic Information Science.* Oxford, Blackwell.

You will recognize that the Bolstad book is also required for *SSCI 581: Concepts for Spatial Thinking.* These textbooks will be supplemented with Course Notes and a mixture of readings from academic journals, professional reports, and authoritative websites.

Readings – To be posted to Blackboard under Course Documents:

- Chrisman, N.R. (1984) The role of quality information in the long-term functioning of a geographic information system. *Cartographica* 21: 79-87.

- Bolstad, P., Gessler, P., and Lilliesand, T.M. (1990) Positional uncertainty in manually digitized map data. *International Journal of Geographical Information Systems* 4: 399-412

- Johnson, C.E. and Barton, C.C. (2004) Where in the world are my field plots? Using GPS effectively in environmental field studies. *Frontiers in Ecology and the Environment* 2: 475-482.

- Goodchild, M.F. and Proctor J. (1997) Scale in digital geographic world. *Geographical and Environmental Modeling* 1: 5-23.

- Frank, A.U. (2010) Scale is introduced in spatial datasets by observation processes. In Devillers, R. and Goodchild, H. (eds) *Spatial Data Quality: From Process to Decisions.* Boca Raton, FL, CRC Press: 17-30.

- Fisher, P.F., Comber, A., and Wadsworth, R. (2010) What's in a name? Semantics, standards, and data quality. In Devillers, R. and Goodchild, H. (eds) *Spatial Data Quality: From Process to Decisions.* Boca Raton, FL, CRC Press: 3-16.

- McBratney, A.B, Santos, M.L.M., and Minasy, B. (2003) On digital soil mapping. *Geoderma* 117: 3-52.

- Goldberg, D.W. and Cockburn, M.G. (2010) Improving geocoding accuracy with candidate selection criteria. *Transactions in GIS* 14: 149-176.

- De Genst, W., Canters, F., and Gulinck, H. (2001) Uncertainty modeling in buffer operations applied to connectivity analysis. *Transactions in GIS* 5: 305-326.

- Onsrud, H.J. (2010) Liability for spatial data quality. In Devillers, R. and Goodchild, H. (eds) *Spatial Data Quality: From Process to Decisions.* Boca Raton, FL, CRC Press: 187-196.

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.
- USC will provide laptops with the ArcGIS and Trimble Office software and a variety of GPS and other kinds of data capture devices for the Catalina field component.

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 Blackboard discussion forums at the start of the semester through which you can use to discuss course assignments, exercises, and projects.

I will send via e-mail through Blackboard any notices that are time sensitive. Please be sure that you read as soon as possible all e-mail sent from Blackboard or from me. Also double

check to be sure that mail sent from both the USC blackboard accounts and my private domain (druddell@usc.edu) does not go into your junk mail!

While I am usually on-line and will probably respond to e-mails from students relatively quickly, I will endeavor to respond to all e-mail 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 e-mail 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. 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 from 8:30 a.m. to 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 are located in Appendix A: http://web-app.usc.edu/scampus/wp-content/uploads/2009/08/appendix_a.pdf . 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 & add classes, change enrollment option to Pass/No Pass or Audit, or to drop a class without a mark of "W" and receive a 100% refund
3/18-23:	Spring recess
4/12:	Last day to drop a class with a mark of "W"
5/3:	Spring semester classes end
5/4-7:	Study days
5/8-15:	Final examinations

Tentative Schedule

Week #	Week Begins	Theme	Week's Readings and Practice		Assignments Due Monday Following		
			Reading	Hands-on	Reading Assign.	GIS/GPS Assign.	Exercises and Papers
1	1/14	Introduction	Wilson 1		1		Personal Resume
2	1/22	Data needs and types	Notes		2		
3	1/28	Global navigation satellite systems	Bolstad 5	GIS/GPS Assign 1		1	
4	2/4	Maps, data entry, editing, and output	Bolstad 4				Exercise 1
5	2/11	Continued…					Exercise 2
6	2/18	Aerial and satellite images	Bolstad 6, Wilson 3	GIS/GPS Assign 2	3	2	
7	2/25	Catalina	Notes				
8	3/4	Continued…					Paper 1
9	3/11	Digital data	Bolstad 7		4		
	3/18	Spring recess					
10	3/25	Continued…	Wilson 2, 4	GIS/GPS Assign 3	5	3	
11	4/1	Data standards and data quality	Bolstad 14		6		
12	4/8	Types and sources of error	Notes		7		
13	4/15	Continued…	Wilson 12		8		
14	4/22	Data quality management and control	Notes				Exercise 3
15	4/29	Continued…			9		
16	5/6	Wrap-up	Notes				
	5/13	Finals					Paper 2