SSCI 584 (Section 35703), Spatial Modeling

Syllabus

Units: 4

Term- Day-Time: Summer, 2016

Location: Online, via Blackboard

Instructor: Dr. Su Jin Lee
Office: AHF B55K
Office Hours: Mondays, 10-11 a.m. PT, and Wednesdays, 1-2 p.m. PT, and by appointment at other times. I am always available asynchronously via email. 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 email. Or we can meet in my Bluejeans room. Just get in touch!
Email: sujinlee@usc.edu
Blue Jeans: www.bluejeans.com/sujinlee
Office: 213-740-2845

GIS Library Help: Katharin Peter
Office: VKC B40a
Office Hours: By appointment
Contact Info: kpeter@usc.edu, 213-740-1700

IT Help: Richard Tsung
Office: AHF 146
Office Hours: By appointment
Contact Info: GISTsupport@usc.edu, 213-821-4415

Course Description
This course will take you beyond the basic understanding of spatial analysis tools you learned in SSCI 583 Spatial Analysis and will provide you with an understanding of a range of spatial modeling concepts, approaches and applications, as well as methods for determining the suitability of a particular modeling approach for a given task. Designed as an online version of an advanced studio course and graduate seminar, you will work individually and in groups to explore, learn, and teach about several different solutions to geospatial modeling challenges.

Expectations in the workplace for today's GIS professionals include the ability to learn continuously, work with many different kinds of data and tools, and with other professionals in other disciplines, domains, and agencies. There are many unique and deep skill sets needed in today's world. However, they do not standalone; the ability to collaborate, to learn from others and to expand opportunities jointly are essential. The collaborative component of this course is essential.

This particular course is an elective in the GIST M.S. and Graduate Certificate Programs, the Geospatial Leadership Graduate Certificate Program, and the GeoHealth track in the Keck School of Medicine's Master of Public Health Program.

Learning Objectives
On completion of this course, students will be able to:
- Explain how complex spatial models can be used to help solve and understand environmental and social problems and management challenges.
- Describe the range of tools and techniques that fall within the collection of spatial analytical models.
- Represent spatially and temporally dynamic social and environmental processes using spatial modeling tools.
- Assess the validity, uncertainty and sensitivity of model results, both in the research literature and in your own work.
- Use and integrate with ArcGIS, alternative modeling solutions including open source GIS options and external software applications.
- Solve GIS tasks of moderate complexity independently with the help of various online resources.
- Collaborate with others to develop team expertise in advanced modeling tools.
- Working with domain experts, outline possible modeling solutions for their loosely specified spatial problems.
- Convey complex technical information and modeling results to a non-technical audience through presentations, reports and graphics.
- Describe how different GIS, modeling, mathematical, and statistical software packages can be integrated to produce results that none of these systems in isolation is able to produce.

Prerequisite(s): None
Co-Requisite (s): None
Concurrent Enrollment: None
Recommended Preparation: SSCI 583: Spatial Analysis

Course Formats
The main theoretical concepts will be provided through text readings and self-directed research you will do in the published literature and on the web and through hands-on experimentation with various tools and technologies.

The course will generally unfold on a biweekly basis. Each pair of weeks, called modules, will be focused on a particular aspect of spatial modeling. In order to make sure you are exposed to as broad a range of material as possible, for some modules, the class will be divided into small groups, each of which will be charged with learning about a different modeling solution or environment. Group members will support each other as you learn your assigned topic, completing some intermediate assignments. At the end of these group work modules, each group will present what they have learned to the remainder of the class in a brief lesson (written or on-line). In this way you will learn some of the material deeply while also learning a little about related topics. You will finish the course by completing a spatial modeling project on a topic of your choice either on your own or in a self-identified group.

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 will find this course will show up in your available courses no later than 12:00 p.m. PT 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 will post a number of discussion threads relevant to various sections of the course. These threads are very important in terms of providing support to each other while working on class exercises to share hints and helpful tips, as you would in a classroom laboratory. I will check the discussion threads periodically and offer occasional comments. Please send me an email directly if you have a question or concern that requires my immediate attention.

Live meetings and presentations: We will use a browser-based service called BlueJeans (www.bluejeans.com/sujinlee) to create synchronous, interactive sessions. With voice and webcam capabilities BlueJeans can be used to share presentations and even our desktops between two or more people.

GIST server and tech support: This course will utilize the GIST Server which is a virtual desktop. You can access the GIST Server at https://gistonline.usc.edu. If you are unable to connect to the server or experience any type of technical issues, send an email to GIST Tech Support at gistsupport@dornsife.usc.edu and make sure to copy (cc) me on the email.

Technological Proficiency and Hardware/Software Required

The geospatial software and data required for course assignments will be accessed using computing resources provided by the Spatial Sciences Institute.

ArcGIS, e-Cognition, TerrSet, and other geospatial software are provided online via the GIST Server. You must satisfy the following technology requirements:

- Every student MUST have a computer with a fast Internet connection.

- Every student MUST have a functional webcam and a microphone 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 Blackboard discussion forums throughout the semester that we will use for the aforementioned assignments and so we can discuss issues and comments on the course assignments, exercises, and projects as the need arises.

In addition, I will send via email 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. Check now to make sure that mail sent from both the USC Blackboard accounts and my private domain (sujinlee@usc.edu) does not go into your junk mail.

While I am usually online and will probably respond to emails from students relatively quickly, I will endeavor to respond to all email within 24 hours of receipt, aiming for no more than 72-hours delay. In the rare case when I expect to be offline for more than 72 hours, I will post an announcement on the Blackboard site.

That said, 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 graduate-level course. Students should expect to spend 10-15 hours per week completing the work in this course.

Required Readings and Supplementary Materials

Textbooks – There are three required textbooks for this course. They are available from the USC Bookstore or online outlets such as Amazon. We encourage you to purchase these books immediately since you will need these materials from the opening day of class.

- O'Sullivan, David, and George L. W. Perry. 2013. *Spatial Simulation: Exploring Pattern and Proces*s. Hoboken, NJ, Wiley-Blackwell.
- Mitchell, Andy. 2012. *The Esri Guide to GIS Analysis, Volume 3: Modeling Suitability, Movement, and Interaction*. Redlands, CA, Esri Press.

- Zuur, Alain F., Elena N. Leno, and Erik Meesters. 2009. *A Beginner's Guide to R*. New York, Springer. Available online at USC Library.

Additional readings that focus on topics relevant to course themes selected by students will be identified as part of the literature search components of each course section.

Description and Assessment of Assignments

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

Resume Assignment (2%): We require all current students to post and maintain a public resume, short biography and recent photo on our shared GIST Student Community Blackboard site. Please prepare your resume in the SSI template which will be provided to you. Unless you opt out, your resume will be included in the Spatial Sciences Institute Graduate Programs Resume Book. This resume book is compiled annually and, along with our web presence, is used to promote our programs, and more importantly, your skills, experience and professional aspirations.

Blogs / Wikis (20%): Throughout the term, the class will explore a variety of topics through graded blogs and wikis. These tasks are designed to engage you in the material and to expand your research results beyond what you are personally able to *uncover*. Requirements for participation by way of comments and responses will be provided in detail in the assignment instructions.

Modeling Assignments (20%): The modeling assignments will give you hands on experience with several different modeling tools and environments (including ArcGIS, NetLogo, and R).

Lesson Presentations (20%): Two of the sections will end with the presentation of a brief learning module through which you will teach your classmates what you have learned (teaching is the best way to learn!). A portion of these points will be assigned through self and peer review which will be described in the assignment instructions.

Final Project (32%): To integrate your learning of all the material covered in the course, you will design, undertake and report on an individually chosen spatial modeling project. The Final Project will have four components including a brief topic statement so that we can discuss your idea (2 points), a proposal with theoretical context and model conceptualization (10 points), a public presentation (5 points, made on-line via Adobe Connect) and a fully annotated and illustrated project report on your model implementation (15 points).

Responses to postings (6%): In order to ensure that everyone learns from everyone else, each student is required to be active in responding to the wiki and blog postings and lesson presentations from other students. Responses must be substantial, informative or probing. Six of the assignments require such responses.

Careful planning and a serious, consistent commitment will be required for you to successfully navigate the various deliverables in this and other GIST courses. The table below summarizes the SSCI 584 course assignments and their point distribution:

Assignments	Number	Points Per Assignment	% of Grade
Resume Assignment	1	2	2
Blogs and Wikis	4	5	20
Modeling Assignments	4	5	20
Lesson Presentations	2	10	20
Responses	6	-	6
Project Components			
Topic Components	1	2	2
Proposal	1	10	10
Presentation	1	5	5
Final Report	1	15	15
Totals	**17**	**-**	**100**

Assignment Submission Policy

Assignments will be submitted for grading via Blackboard using the due dates specified in the Course Schedule below.

Additional Policies

Students are expected to attend and participate in every class session and to complete and upload all assignments no later than 11:59 p.m. PT on the deadlines detailed in the Course Schedule. Late work will be assessed a penalty of 10% per day and zero grades will be assigned for work that is more than four days late.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Assignments	Deliverables/Due Dates
Week 1 5/18* *Class starts on Wednesday, 5/18	**Modeling Foundations** Introductions and some introductory materials to help you get oriented to this course	O'Sullivan & Perry, Ch. 1 Mitchell, Ch. 1 + others Resume Assignment Intro Blog & Response	No deliverables.
Week 2 5/23		O'Sullivan & Perry, Ch. 2 & 6+ others Modeling Wiki 1 Response to Modeling Wiki 1	Resume Assignment: Monday, 5/23 Intro Blog: Monday, 5/23 Response: Wednesday, 5/25
Week 3 5/31* *Monday, 5/30 is a university holiday	**Modeling with ArcGIS:** In this first modeling module we'll work in familiar territory by using the modeling tools available in ArcGIS.	Mitchell, Ch. 4-6 ArcGIS Assignment	Modeling Wiki 1: Tuesday, 5/31 Response: Thursday, 6/2
Week 4 6/6		From Library Research Lesson (ArcGIS) Response to Lesson (ArcGIS)	ArcGIS Assignment: Monday, 6/6

Week 5 6/13	**Agent-based Models:** A new tool and a completely new way of thinking about spatial models and spatial modeling.	O'Sullivan & Perry, Ch. 3-5 Modeling Wiki 2 Response to Modeling Wiki 2	Lesson (ArcGIS): Monday, 6/13 Response: Wednesday, 6/15
Week 6 6/20		From Library Research NetLogo Assignment	Modeling Wiki 2: Monday, 6/20 Response: Wednesday, 6/22
Week 7 6/27	**External Models:** This module will give you an opportunity to look at a lot of very different kinds of models, and begin to make some decisions about what you'll do in your project. **Documenting Models:** Now you will begin on your project by preparing a proposal of your intended model.	From Web Research Modeling Wiki 3 Response to Modeling Wiki 3	NetLogo Assignment: Sunday, 6/27
Week 8 7/5* *Monday, 7/4 is a university holiday		O'Sullivan & Perry, Ch. 7-9 Topic Statement Individual Meeting Project Proposal	Modeling Wiki 3: Tuesday, 7/5 Response: Thursday, 7/7
Week 9 7/11		From Library Research Lesson (External) Response to Lesson (External)	Topic Statement: Monday, 7/11 Individual Meeting Thursday, 7/14
Week 10 7/18	**Modeling with R:** Modeling language R provides infinite opportunities for spatial modeling.	R tutorial R Assignment 1	Project Proposal: Monday, 7/18 Lesson (External): Monday, 7/18 Response: Wednesday, 7/20
Week 11 7/25		Zuur, Ieno, and Meesters, Ch.1-4, & 9 R Assignment 2	R Assignment 1: Monday, 7/25
Week 12 8/1	**Final Report:** These final weeks are devoted to completing, presenting and reporting on your final project.	Project Presentation Project Report	R Assignment 2: Monday, 8/1 Project Presentation: Friday, 8/5
Week 13 8/8* *Tuesday, 8/9 is the last day of classes			Final Report: No later than 05:00 p.m. PT on Tuesday, 8/12

Statement on Academic Conduct and Support Systems

Academic Conduct
Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu or to the *Department of Public Safety* http://adminopsnet.usc.edu/department/department-public-safety. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems
A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

Resources for Online Students
The Course Blackboard page and the GIST Community Blackboard page have many resources available for distance students enrolled in our graduate programs. In addition, all registered students can access electronic library resources through the link https://libraries.usc.edu/. Also, the USC Libraries have many important resources available for distance students through the link http://libguides.usc.edu/distancelearning. This includes instructional videos, remote access to university resources, and other key contact information for distance students.