USC Dornsife
Dana and David Dornsife
College of Letters, Arts and Sciences
Spatial Sciences Institute

SSCI 579, Geospatial Intelligence Tradecraft

Syllabus

Units: 4

Term — Day — Time: Fall, 2015, Online

Location: Online, via Blackboard

Instructor: COL [R] Steven D. Fleming, Ph.D.
Office: AHF B55D
Office Hours: Monday and Wednesdays, 9:00-10:00 am PST, 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 Adobe Connect room. Just get in touch!

Contact Info: stevendf@usc.edu**,** 213-740-7144
Adobe Connect:
http://usccollege.adobeconnect.com/stevendf/
Skype: sdfleming85

Library Help: Katharin Peter
Office: VKC B40A
Hours of Service: By appointment
Contact Info: kpeter@usc.edu, 213-740-1700 (office)

IT Help: Richard Tsung
Hours of Service: Monday to Friday, 9:00 am-5:00 pm PST
Contact Info: ctsung@usc.edu, 213-821-4415

Course Description

This course is a required capstone for the Graduate Certificate in Geospatial Intelligence and provides students with the requisite knowledge and practical skills to inform effective decision-making in a variety of human security settings. Threats to human security come in many forms – military operations, terrorist attacks, genocide, political violence, natural disasters, humanitarian crises, environmental risks, public health issues and food / resource accessibility challenges, among others – and this class leverages a variety of geospatial technologies with intelligence tradecraft to develop intelligence products that support national security, disaster response, and humanitarian relief efforts. The geospatial intelligence approach is often referred to as TCPED (tasking, collection, processing, exploitation, dissemination) and the results are used to inform and support more effective decision-making.

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.

Learning Objectives

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

- Describe the core geospatial intelligence needs related to surveillance, targeting and navigation.
- Design and implement strategies for capturing or sourcing geospatial data and any accompanying metadata.
- Critically evaluate the potential impacts of data quality on spatial analysis and decision making.
- Master the theory and protocols involved in interpreting radar, infrared and multispectral imagery, and full motion video as well as legacy maps, digital geospatial datasets, and relatively new data sources (i.e. geosensor systems, social media feeds).
- Develop critical thinking, collaboration, and communication skills.

- Prepare and present intelligence reports tailored to a variety of the human security applications.

Prerequisite(s): None **Co-Requisite (s):** None **Concurrent Enrollment:** None
Recommended Preparation: SSCI 581: Concepts for Spatial Thinking

Technological Proficiency and Hardware/Software Required
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 classes no later than 12:00 noon, PST 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 related to various course topics. 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 do in a classroom setting. I will check the discussion threads periodically and offer occasional comments. Please send your course instructor 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 Adobe Connect to create synchronous, interactive 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 easier to use the free VOIP and chat technology, Skype (http://www.skype.com/) for individual chats.

GIST server and tech support – This course will utilize the GIST Servers to provide you with your own 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. GIST Tech Support is available Monday through Friday, 9:00 a.m.to 5:00 p.m. PST. A variety of geospatial software platforms (ArcGIS, e-Cognition, Idrisi, etc.) are provided online via the GIST Server; hence, you do not need to install it on your own computer. Instead, every student must satisfy the following technology requirements: (1) a computer with a fast Internet connection; (2) a functional webcam and a microphone for use whenever a presentation or meeting is scheduled; and (3) a modern web browser, Firefox recommended, to access the GIST Server (in the event you want or need to).

Required Readings and Supplementary Materials

Textbooks – There are five required texts for this course. Some are available online and some are available from the USC Bookstore or online outlets such as Amazon. We encourage you to acquire or purchase these books quickly since you will need these materials from the opening day of class.

- Heuer, R.J. (1999) *Psychology of Intelligence Analysis*. Washington, D.C., Center for the Study of Intelligence (available at http://www.scip.org/files/Resources/HeuerPsychology-of-Intelligence-Analysis.pdf)
- Lowenthal, M.M. (2011) *Intelligence: From Science to Policy* (5th Edition). Washington, DC, CQ Press
- NGA (National Geospatial-Intelligence Agency, Office of Geospatial-Intelligence Management (2006) *National System for Geospatial Intelligence: Geospatial Intelligence (GEOINT) Basic Doctrine.* Washington, DC, National Geospatial-Intelligence Agency Publication No. 1-0 (available at https://www.fas.org/irp/agency/nga/doctrine.pdf)
- NRC (National Research Council) (2007) *Successful Response Starts with a Map: Improving Geospatial Support for Disaster Management.* Washington, DC, National Academies Press
- Tuathail, G.O., Dalby, S., and Routledge, P. (2003) *The Geopolitics Reader* (2nd Edition). London, Routledge (available at http://frenndw.files.wordpress.com/2011/03/geopol-the-geopolitics-reader.pdf)

These textbooks will be supplemented with Course Notes and a mixture of readings from academic journals, professional reports, and authoritative websites.

Readings – The following book chapters and journal articles will be posted to Blackboard under Course Documents:

- Wheaton, K.J. and Chido, D.E. (2006) Structured analysis of competing hypotheses: Improving a tested intelligence methodology. *Competitive Intelligence Magazine* 9(6): 12-15
- Medina, R.M. and Hepner, G.F. (2011) Advancing the understanding of sociospatial dependencies in terrorist networks. *Transactions in GIS* 15: 577-597.
- Klein, G., Moon, B., and Hoffman, R. (2006) Making sense of sensemaking: 1, Alternative perspectives. *IEEE Intelligent Systems* 21(4): 70-73
- Corson, M.W. and Palka, E.J. (2004) Geotechnology, the US military, and war. In Bruun, S.D., Cutter, S.L., and Harrington, J.W. (eds.) *Geography and Technology.* Dordrecht, The Netherlands, Kluwer: 401-427.
- Palka, E.J., Galgano, F.A., and Corson, M.W. (2006) Operation Iraqi Freedom: A military geographic perspective. *Geographical Review* 95: 373-399.

- Medina, R.M., Siebeneck, L.K., and Hepner, G.F. (2011) A geographic information systems (GIS) analysis of spatiotemporal patterns of terrorist incidents in Iraq 2004-2009. *Studies in Conflict and Terrorism* 34: 862-882.
- Stefanidis, A., Crooks, A., and Radzikowski, J. (2013a) Harvesting ambient geospatial information from social media feeds. *GeoJournal* 78: 319-338.
- Crooks, A., Croitoru, A., Stefanidis, A., and Radzikowski, J. 2013. #Earthquake: Twitter as a Distributed Sensor System, *Transactions in GIS,* 17(1): 124-147.
- Stefanidis, A., Cotnoir, A., Croitoru, A., Crooks, A., Rice, M., and Radzikowski, J. (2013b) Demarcating new boundaries: Mapping virtual polycentric communities through social media content. *Cartography and Geographic Information Science* 40: 116-129
- Croitoru, A., Crooks, A., Radzikowski, J., and Stefanidis, A. (2013) GeoSocial Gauge: A system prototype for knowledge discovery from social media. *International Journal of Geographical Information Science* 27: 2483-2508

Description and Assessment of Assignments

Your grade in this course 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. With your permission, your photo and short biographical sketch may be posted to the Spatial Sciences Institute website and your resume will be included in the GIST Resume Book. The latter is compiled annually and along with our Web presence used to promote our programs and more importantly, your skills, experience, and professional aspirations.

Reading Assignments (10%) – 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. The first reading assignment is required and following this assignment, you are free to choose any four of the nine subsequent assignments but you must complete and submit them for grading in the weeks specified at the end of this syllabus.

Discussion Forums (8%) – These will focus on varying combinations of theory and practice and anticipate that you will contribute to and participate in a series of discussion threads and blogs at designated times throughout the semester.

Exercises (40%) – In order to demonstrate that you understand the basic concepts and skills learned in the class, you will complete five exercises that will follow the key components of a typical geospatial intelligence workflow (TCPED – tasking, collection, processing, exploitation and dissemination) and integrate key concepts and ideas and take some independent thought.

Final Project (40%) – The final projects will afford you the opportunity to work in small teams and demonstrate your ability to identify and rapidly investigate a real-world problem using the coursework you have completed thus far. Working in small teams, you will all make extensive use of geospatial data sources and analysis tools and will be required to define possible scenarios, identify key challenges, explore possible solutions and deliver a preferred and an effective solution for an important human security need or challenge in your final project. These projects will dominate the second half of the semester and the outputs will include four distinct but interrelated products. The first is a proposal describing what you will do and why it is important (5 points), the second is a brief report summarizing the data sources and types that will be deployed along with an assessment of strengths and weaknesses (10 points), the third is a brief video presentation describing progress to date (5 points) and the last component is a final report summarizing the problem at hand, the geospatial data that was used, the analysis that was performed, and whether or not, and if so, what spatial intelligence can be gathered from the results (20 points). The layout and contents of these various components will be tailored to the threat at hand. These human security threats could easily include one or more of the following – military operations, terrorist attacks, genocide, political violence, natural disasters, humanitarian crises, environmental risks, public health issues, and food/resource accessibility challenges – and the various tasks and products would be tailored to the subset chosen for each final project.

Grading Breakdown

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 579 course assignments and their point distribution:

Assignment	**Points**	**% of Grade**
Discussion forums	80	8
Exercises	400	40
Reading assignments	100	10
Resume assignment	20	2
Team Project		
Proposal	50	5
Data report	100	10
Presentation	50	5
Final report	200	20
TOTAL	**1000**	**100**

And finally, it is important to note from the outset that: (1) you are expected to attend and participate in every class session and to complete and upload all assignments before the deadlines detailed in the Course Schedule; (2) late postings and assignments will be docked one grade and no grade will be given for postings or assignments turned in more than one week late; and (3) no written work will be accepted for grading after 5:00 p.m. PT on the last day of classes.

Assignment Submission Policy

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

Additional Policies

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 multiple 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 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. Check now to make sure that mail sent from both the USC blackboard accounts and my private domain (stevendf@usc.edu) does not go into your junk mail!

While I am usually online 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 48 hours delay. In the rare case when I expect to be offline for more than 60 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 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 12-15 hours per week completing the work in this course.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Homework	Deliverables/ Due Dates
Week 1 8/24	**Geospatial Intelligence Context:** Introduction to the intelligence community, the players and their typical roles and responsibilities.	Videos; Wheaton & Chido (2006)	Reading Assignment #1 Resume Assignment
Week 2 8/31	**Core Needs:** Role of surveillance, targeting and navigation in geospatial intelligence tradecraft.	Tuathail et al. (2003) Ch. 1-2; Medina & Hepner (2011)	Group Discussion #1 Reading Assignment #2
Week 3 9/7	**Role of Physical and Human Geography:** Introduction to the ways in which physical and human geography can be used to situate geospatial intelligence work within an appropriate context.	Tuathail et al. (2003) Ch. 3-5; Klein et al. (2006)	Group Discussion #2 Reading Assignment #3
Week 4 9/14	**Geospatial Building Blocks:** Introduction to the ways in which fundamental geographic information science principles and the accompanying geospatial technologies (GIS, GPS, photogrammetry, remote sensing, sensor networks) have been used for intelligence problem-solving.	Lowenthal (2011) Ch. 1-5; Corson &Palka (2004)	Group Discussion #3 Reading Assignment #4
Week 5 9/21	**Geospatial Building Blocks (cont.):** Threats to human security and the geospatial data and workflows that have been deployed to address them.	Lowenthal (2011) Ch. 6-8; Palka et al. (2006)	Group Discussion based on readings (Blog #4) Reading Assignment #5
Week 6 9/28	**Foundations of Geospatial Intelligence Analysis:** Introduction to the information exploitation process and the ways in which standard intelligence methodologies, such as the Geospatial Intelligence Preparation of Environment (GPE) methodology and Structured Spatial Analytic Method (SGAM), can be utilized to respond to a variety of human security challenges.	Heuer (1999) Ch. 1-8; Medina et al. (2011)	Exercise #1 Reading Assignment #6

Week 7 10/5	**Gathering Intelligence from Legacy Geospatial Data Products:** Methods and approaches for linking legacy geospatial datasets with other kinds of information to yield useful spatial intelligence (e.g. the fusion of transportation maps and train schedules to build possible travel trajectories anywhere in the world).	NRC (2007) Ch. 1-6	Exercise #2
Week 8 10/12	**Role of Data Mining:** Methods and approaches for linking textual information to geographic locations.	NGA (2006) Ch. 1	Exercise #3
Week 9 10/19	**Gathering Geospatial Data from Sensors and Satellites:** The ways in which the capabilities and characteristics of various satellite and sensor systems, full motion video, and unmanned aerial vehicles can be used for feature extraction and linked to specific intelligence problem-solving tasks.	NGA (2006) Ch. 2	Exercise #4
Week 10 10/26	**Gathering Geospatial Data from Social Media Feeds:** Methods and approaches for extracting and analyzing large quantities of geosocial data from a variety of social media feeds.	NGA (2006) Ch. 3; Stefanidis et al. (2013a)	Exercise #5 Reading Assignment #7
Week 11 11/2	**Data Fusion, Integration, and Geovisualization:** The role of data fusion, integration, and geovisualization in the creation and distribution of actionable information.	Heuer (1999) Ch. 9-13; Crooks et al. (2013)	Final Project Proposal Reading Assignment #8
Week 12 11/9	**Geospatial Intelligence Products and Communication:** The role and character of intelligence briefs, imagery and area reports in human security applications.	Lowenthal (2011) Ch. 9-12	Final Project Data Report

Week 13 11/16	**Geospatial Intelligence Products and Communication (cont.):** The rapidly evolving number and variety of interactive and dynamic products that can used along with threat and hazard evaluation, the preparation and presentation of predictive analytic conclusions, and the role of situational awareness and the common operating picture in human security applications.	NGA (2006) Ch. 4-5; Stefanidis et al. (2013b)	Reading Assignment #9 Final Project Presentation
Week 14 11/23	**Emerging Geospatial Intelligence Technologies and Techniques:** Exploration of how some of the new mobile devices and applications, virtual and augmented reality opportunities, and cartographic representations and visualization techniques might be used to acquire or extract meaning from rich and multi-dimensional datasets in a variety of human security settings.	Lowenthal (2011) Ch. 13-14; Croitoru et al. (2014)	Reading Assignment #10
Week 15 11/30	**Emerging Geospatial Intelligence Technologies and Techniques (cont.):** Team presentations summarizing results and what was learned from the projects.	Lowenthal (2011) Ch. 15	Final Project Reports

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-violatinguniversity-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://capsnet.usc.edu/department/department-public-safety/online-forms/contactus. 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.