SSCI 579 (Section 35624D), Geospatial Intelligence Tradecraft

Syllabus

Units: 4

Term — Day — Time: Spring, 2021, Online

Location: Online

Instructor: COL [R] Steven D. Fleming, Ph.D.
Office: AHF B55
Office Hours: Mon/Wed; 8-9 AM. I plan to open my Zoom room during this time. However, students still need to inform me in advance that they desire to meet during these office hours so that I can allocate time to their specific needs. Additionally, I am available asynchronously via email and synchronously via phone on most days and times *by prior arrangement* via email.
Contact Info: s.fleming@usc.edu**,** 213-740-7144.

Library Help: Andy Rutkowski
Office: VKC 36B
Office Hours: Thurs 10 AM – 12 PM (noon) PT
Contact Info: arutkows@usc.edu
Zoom: Provided via Blackboard

IT Help: Richard Tsung
Office: AHF 145D
Office Hours: By appointment
Contact Info: spatial_support@usc.edu, 213-821-4415

Course Scope and Purpose

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, including military operations, terrorist attacks, genocide, political violence, natural disasters, humanitarian crises, environmental risks, public health issues, and food/resource accessibility challenges. 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 tasking, collection, processing, exploitation, and dissemination (TCPED), and the results are used to inform and support more effective decision-making.

This is not only a required capstone course for the Geospatial Intelligence Graduate Certificate program but it is also a required course in the M.S. in Human Security and Geospatial Intelligence (HSGI) Program. By authorization ONLY, it may serve as an elective for the M.S. in Geographic Information Science and Technology (GIST) Program, the GIST Graduate Certificate Program, and Geospatial Leadership Graduate Certificate programs.

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-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. geo-sensor systems, social media feeds).
- Apply critical thinking, collaboration, and communication skills via course exercises and the final course project.
- 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

Class Conduct

Harassment, sexual misconduct, interpersonal violence, and stalking are not tolerated by the university. All faculty and most staff are considered Responsible Employees by the university and must forward all information they receive about these types of situations to the Title IX Coordinator. The Title IX Coordinator is responsible for assisting students with supportive accommodations, including academic accommodations, as well as investigating these incidents if the reporting student wants an investigation. The Title IX office is also responsible for coordinating supportive measures for transgender and nonbinary students such as faculty notifications, and more. If you need supportive accommodations you may contact the Title IX Coordinator directly (titleix@usc.edu or 213-821-8298) without sharing any personal information with me. If you would like to speak with a confidential counselor, Relationship and Sexual Violence Prevention Services (RSVP) provides 24/7 confidential support for students (213-740-9355 (WELL); press 0 after hours).

Technological and Communication Requirements

ArcGIS is provided online via the GIST Server; hence, you do not need to install it on your own computer. Instead, every student must have the following technology requirements:

- A computer with a fast Internet connection.
- A functional webcam and a microphone for use whenever a presentation or meeting is scheduled.

- An up-to-date web browser to access the Server

SSI Server and Tech Support – This course utilizes the SSI Server which is a virtual desktop giving access to many different professional software. If you are unable to connect to the server or experience any type of technical issues, send an email using your USC account to SSI Tech Support at spatial_support@usc.edu, making sure to copy (cc) me on the email.

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 Blackboard. 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.

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. Do not ignore course email until the day before assignments are due. Also double check to be sure that email sent from the USC blackboard account does not go into your junk mail!

While I am usually on-line all day 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 72 hours delay. In the rare case when I expect to be off-line for more than 72 hours, I will post an announcement on the Blackboard site.

Discussion forums – On the Blackboard site, I will post a series of discussion threads relevant to various sections of the course. Discussions provide a key means for student-to-student discussion and collaboration that can replicate the face-to-face contact you may have experienced in traditional classrooms. Here students can provide support to each other while working on your assignments, sharing hints and helpful tips, as you would in a classroom laboratory. Please post your questions about assignments there, as you would ask them publically in the classroom. I monitor the discussion threads and offer comments when necessary, but more importantly, consider the discussion board a key way to connect with your classmates and share your discoveries.

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.

- Lowenthal, M.M. 2017. *Intelligence: From Secrets to Policy* (7th Edition). Washington, DC: CQ Press.
- Heuer, R.J. 1999. *Psychology of Intelligence Analysis*. Washington, DC: Center for the Study of Intelligence. (available at https://www.cia.gov/library/center-for-the-

study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/PsychofIntelNew.pdf).

- NGA (National Geospatial-Intelligence Agency, Office of Geospatial-Intelligence Management). 2018. *National System for Geospatial Intelligence: Geospatial Intelligence (GEOINT) Basic Doctrine*. NGA Publication No. 1-0. Washington, DC: National Geospatial-Intelligence Agency Publication. (available at https://www.nga.mil/ProductsServices/Pages/GEOINT-Basic-Doctrine-Publication.aspx).
- 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 https://www.researchgate.net/publication/249470493_The_Geopolitics_Reader_2nd_edition).

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. pp 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.
- Treverton, G. and Gabbard, B. 2008. "Assessing the Tradecraft of Intelligence Analysis," RAND (National Security Research Division).
- 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 – 1 worth 2 points. We require all current students to post and maintain a public resume, short biography and recent photo on our shared SSI 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.

Reading Assignments – 5 worth a total of 10 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.

Discussion Forums – 4 worth total of 8 points. 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 – 5 worth a total of 40 points. 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). In these assignments, you will be required to integrate key concepts and ideas and take some independent thought.

Final Project – 1 worth a total of 40 points. The final project 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 presentation describing your findings (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	Total	% of Grade
Weekly Assignments			
Discussion forums	4 @ 2 pts each	8	8
Exercises	5 @ 8 pts each	40	40
Reading assignments	5 @ 2 pts each	10	10
Resume assignment	1 @ pts 2	2	2
Team Project Components			
Proposal	1 @ 5 pts	5	5
Data report	1 @ 10 pts	10	10
Presentation	1 @ 5 pts	5	5
Final report	1 @ 20 pts	20	20
TOTAL		**100**	**100**

And finally, it is important to note from the outset that: (1) you are expected to complete/upload all assignments at the time detailed; (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. Any exceptions to these rules for meeting deadlines are only made by me in coordination with individual students. An example of an exception would be a student's illness or injury that reasonably prohibits course involvement/participation.

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 official email 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

	Topic	Readings	Deliverables/ Due Dates
Week 1 1/18*	**Geospatial Intelligence Context:** Introduction to the intelligence	Videos; Wheaton & Chido (2006)	Reading Assignment #1; Resume

*Monday, is a university holiday	community, the players and their typical roles and responsibilities.		Assignment **Due 1/25**
Week 2 1/25	**Core Needs:** Role of surveillance, targeting and navigation in geospatial intelligence tradecraft.	Tuathail et al. (2003) Ch. 1-2; Medina & Hepner (2011)	Forum #1; Reading Assignment #2 **Due 2/1**
Week 3 2/1	**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)	Forum #2; Reading Assignment #3 **Due 2/8**
Week 4 2/8	**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 (2017) Ch. 1-5; Corson &Palka (2004)	Forum #3; Reading Assignment #4 **Due 2/15**
Week 5 2/15	**Geospatial Building Blocks (cont.):** Threats to human security and the geospatial data and workflows that have been deployed to address them.	Lowenthal (2017) Ch. 6-8; Palka et al. (2006)	Forum #4; Reading Assignment #5 **Due 2/22**
Week 6 2/22* * Monday, 2/22 is a university holiday	**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); Treverton (2008)	Exercise #1 **Due 3/1**

Week 7 3/1	**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 *Due 3/8*
Week 8 3/8	**Role of Data Mining:** Methods and approaches for linking textual information to geographic locations.	NGA (2018) Ch. 1	Exercise #3 *Due 3/15*
Week 9 3/15	**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 (2018) Ch. 2	Exercise #4 *Due 3/22*
Week 10 3/22	**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 (2018) Ch. 3; Stefanidis et al. (2013a)	Exercise #5 *Due 3/29*
Week 11 3/29	**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 *Due 4/5*
Week 12 4/5	**Geospatial Intelligence Products and Communication:** The role and character of intelligence briefs, imagery and area reports in human security applications.	Lowenthal (2017) Ch. 9-12	Final Project Data Report *Due 4/12*

Week 13 4/12	**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 (2018) Ch. 4-5; Stefanidis et al. (2013b)	Final Project Preparation
Week 14 4/19	**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 (2017) Ch. 13-14; Croitoru et al. (2014)	Final Project Presentation ***Due 4/26***
Week 15 4/26* * Friday, 4/30 is the last day of class	**Final Discussions** This week is dedicated to final discussions about your final reports and topics covered in Weeks 13-14.	Lowenthal (2017) Ch. 15: Croitoru et al. (2014)	Final Project Presentation ***Due 4/30***
Exam Week 5/5 – 5/12	**Final Project Report** Individual report summarizing results and what was learned.	None	Final Project Report ***Due 5/7***

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 Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. 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.

Support Systems

Counseling and Mental Health– (213) 740-9355 – 24/7 on call
engemannshc.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline – 1 (800) 273-8255 – 24/7 on call
 www.suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-9355(WELL), press "0" after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) – (213) 740-5086 |Title IX Compliance – (213) 821-8298
equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment– (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs – (213) 740-0776
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention – (213) 821-4710
uscsa.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC – (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety – - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.

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: https://libraries.usc.edu/faculty-students/distance-learners. These include instructional videos, remote access to university resources, and other key contact information for distance students.