

SSCI 401L (Section 35773R), Geospatial Intelligence

Units: 4

Term — Day — Time: Fall, 2021; Class:
Tuesday and Thursday, 9:30-10:50 AM.

Please note this is a residential course with in-class attendance required for lecture and lab meetings. This course will not be offered in a hybrid format.

Students are expected to comply with all aspects of USC's COVID-19 policy. Failure to do so may result in removal from the class and referral to Student Judicial Affairs and Community Standards.

Locations:

Lecture: CPA 102.

Lab: Tuesday, 12:00-1:50 PM in HED 103 and
Friday, 2:00-3:50 PM in SOS B45

Instructor: COL [R] Steven D. Fleming, Ph.D.

Office: AHF B55 and/or Zoom

Office Hours: Tuesday 8-9 AM and Thursday 8-9 AM
PT, and *by prior arrangement* via email.

Contact Info: s.fleming@usc.edu, 213-740-7144

Instructor: Darren Ruddell, Ph.D.

Office: AHF B57F and/or Zoom

Office Hours: Tuesday 11 AM-12 PM and Thursday
8:30-9:30 AM PT, and by appointment via email.

Contact Info: druddell@usc.edu, 213-740-0521

Lab Instructor: Shea Ellen Gilliam

Office: AHF B55 and/or Zoom

Office Hours: Wednesday 10-11 AM (on Zoom – see
link posted on course Blackboard website) Friday 1-2
PM (on campus), and by appointment via email.

Contact Info: sgilliam@usc.edu, 213-740-5910

Library Help: Andy Rutkowski
Office: VKC 36B
Office Hours: Tuesdays 10 AM-12 PM PT
Contact Info: arutkows@usc.edu, 213-740-6390

IT Help: Richard Tsung
Office: AHF B55
Office Hours: By appointment
Contact Info: spatial_support@usc.edu, 213-821-4415

Course Scope and Purpose

Threats to human security come in many forms – natural disasters, humanitarian crises, environmental risks, public health issues, military operations, terrorist attacks, genocide, political violence, and food/resource accessibility challenges, among others. This class leverages a variety of geospatial technologies with intelligence tools to develop intelligence products that support disaster response, humanitarian relief efforts, and national security. It provides students with the basic geospatial intelligence knowledge and practical skills to assist in informing decision-making in a variety of human security settings. This is a required, standalone course (no pre-requisite required) for the undergraduate minor and the major in Human Security and Geospatial Intelligence.

Learning Objectives

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

- Describe the core geospatial intelligence needs related primarily to human security and safety (e.g., disaster response, humanitarian relief efforts, military operations, surveillance, navigation, emergency response, etc...).
- Describe and design implementation strategies for collecting or sourcing geospatial data and any accompanying metadata.
- Critically evaluate the potential impacts of data quality on spatial analysis and decision-making.
- Apply critical thinking, collaboration, and communication skills.
- Prepare and present intelligence reports using geospatial tools that are tailored to a variety of human security applications.

Students may vary in their competency levels on these abilities. You can expect to acquire these abilities only if you honor all course policies, attend classes regularly, complete all assigned work in good faith and on time, and meet all other course expectations of you as a student.

Prerequisite(s): None

Co-Requisite (s): None

Concurrent Enrollment: None

Recommended Preparation: IR 381: Introduction to International Security
SSCI 301L: Maps and Spatial Reasoning

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).

Course Structure

In addition to the lectures, there are a series of online weekly discussions designed to reinforce course concepts and to provide students a forum to share and explore intelligence processes underlying the responses to and human impacts associated with various disaster events (both natural and manmade). All discussions are linked to the lectures and class assignments, but do not duplicate the lecture experience. No make-up dates will be offered for missed exams, so mark the appropriate dates on your calendars. If there is legitimate conflict, speak with the course instructor as soon as possible so alternative arrangements can be made.

Technological Proficiency and Hardware/Software Required

Students will be introduced to geospatial technologies by utilizing Esri services and products. This course will use ArcGIS Online (AGOL) to investigate intelligence concerns, homeland security issues, disaster management concepts, and emergency management operations whereby students will locate and explore various spatial datasets that offer unique and innovative insights into intelligence, security, safety, and disaster response solutions.

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

Required Readings and Supplementary Materials

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

- Clark, R. 2020. *Geospatial Intelligence – Origins and Evolution*. Georgetown Washington, DC: University Press (find at: <http://press.georgetown.edu/book/georgetown/geospatial-intelligence>).
- Starr, H. 2013. *On GEOPOLITICS: Space, Place, and International Relations*. Boulder, CO: Paradigm Publishers.
- NGA (National Geospatial-Intelligence Agency, Office of Geospatial-Intelligence Management). 2018. *National System for Geospatial Intelligence: Geospatial Intelligence (GEOINT) Basic Doctrine*. Washington, DC: National Geospatial-Intelligence Agency Publication No. 1-0 (FREE download 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. (provided by instructor via Blackboard)

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 are tentatively planned for use and will be posted to Blackboard under Course Documents. Additional articles may be added to this list:

- 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.
- Esri. 2015a. Building Safe Communities: An Executive Summary, An Esri White Paper – July 2015, Redlands, CA: Esri Press.
- Esri. 2015b. How to Build Safer Communities: An Executive Summary, An Esri White Paper – July 2015, Redlands, CA: Esri Press.
- Esri. 2012. ArcGIS for Emergency Management, An Esri White Paper – July 2012, Redlands, CA: Esri Press.
- Esri. 2014. GIS Platform for National Security, An Esri White Paper – July 2014, Redlands, CA: Esri Press.
- Esri. 2007. GIS Supporting the Homeland Security Mission, An Esri White Paper – May 2007, Redlands, CA: Esri Press.

- Esri. 2007. GIS in Defense Installation and Environmental Management, Redlands, CA: Esri Press.
- Fleming, S., Hendricks, M., and Brockhaus, J. 2009. CHAPTER 57 - The Role of GIS in Military Strategy, Operations and Tactics. *Manual of Geographic Information Systems*, ASPRS Press: 967-985.
- Fleming, S., Jordan, T., Madden, M., Usery, E., and Welch, R. 2009. GIS applications for military operations in coastal zones. *ISPRS Journal of Photogrammetry and Remote Sensing* Volume 64 (2009): 213-222.
- Klein, G., Moon, B., and Hoffman, R. 2006. Making sense of sense making: 1, Alternative perspectives. *IEEE Intelligent Systems* 21(4): 70-73.
- Palka, E. 2000. A Decade of Instability and Uncertainty: Mission Diversity in the MOOTW Environment. *The Scope of Military Geography*. 167-196.
- Palka, E.J., Galgano, F.A., and Corson, M.W. 2005. Operation Iraqi Freedom: A Military Geographic Perspective. *Geographical Review* 95: 373-399.
- USGIF. *Building Resilient Communities Through Geospatial Intelligence*. 2018. Reston, VA: United States Geospatial Intelligence Foundation.
- USGIF. Save and Protect, 2017. *Trajectory Magazine*. Reston, VA: United States Geospatial Intelligence Foundation.
- USGIF. *State and Future of GEOINT: 2015-2019*. Reston, VA: United States Geospatial Intelligence Foundation.
- USGIF. Trajectory 2019 Issue 3, 2019. *Trajectory Magazine*. Reston, VA: United States Geospatial Intelligence Foundation.
- Treverton, G. and Gabbard, B. 2008. Assessing the Tradecraft of Intelligence Analysis, RAND (National Security Research Division).

Description and Assessment of Assignments

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

Homework Assignments – 5 worth a total of 20 points (4 pts each). Students will be required to complete five homework assignments comprised of quantitative and/or qualitative analysis to gain insight on the physical and human processes underlying intelligence activities, natural hazards, disasters, and emergency management/safety as well as examine the impact these events have for decision makers.

Labs/Report – 5 worth a total of 35 points (7 pts each). In order to demonstrate an understanding of the basic concepts and skills learned in the class, students will complete four labs and one report that will leverage GIS&T software and the key components of a typical geospatial intelligence workflow while integrating key concepts and ideas. These labs and the report reinforce independent thought and application.

Mid-term Exam – 1 worth 12 points. The mid-term exam will consist of multiple choice, short answer, and simple problem questions. Students will be expected to take the exam at the indicated time.

Final Project – 1 worth 15 points. The final team project will afford you the opportunity to demonstrate your ability to identify and rapidly investigate a real-world GEOINT problem using coursework you have completed thus far. You will make extensive use of geospatial data sources and analysis tools and will be required to define a real-world problem using the 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. 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 – natural disasters, humanitarian crises, environmental risks, public health issues, military operations, terrorist attacks, genocide, political violence, and food/resource accessibility challenges – and the various tasks and products would be tailored to the subset chosen for each final project.

Final Exam – 1 worth 18 points. The cumulative final exam will consist of multiple choice, short answer, and simple problem questions. Students will be expected to take the final exam at the indicated time.

Grading Breakdown

Careful planning and a serious, consistent commitment will be required for you to successfully navigate the various deliverables in this and other SSCI courses. The table below summarizes the SSCI 401L course assignments and their point distribution:

Assignment	Number	Points each	% of Grade
Home Assignment (HA)	5	4	20
Lab (4) / Report (1)	5	7	35
Mid-term Exam	1	12	12
Final Project	1	15	15
Final Exam	1	18	18
TOTAL	13		100

Assignment Submission Policy

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

Students are expected to attend and participate in every class session (real-time or via watching a video of class) and to complete and upload all assignments before 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/Watchings Assignments	Deliverables
BLOCK 1 – Intro to GEOINT	Week 1 23-27 Aug	Geospatial Intelligence Context Introduction to the concept of GEOINT, the intelligence community, types of intelligence analysis, the players/their typical roles and responsibilities, and the role of GIS in Human Security.	Videos; Esri (2014); Starr (2013) Ch. 1-2; Clarke (2020) Ch. 1 Homework Assignment # 1	None
	Week 2 30 Aug – 3 Sep	Basic Roles and Requirements Role of disaster management, humanitarian assistance, surveillance, and navigation in geospatial intelligence plus GEOINT importance to International Relations.	Esri (2012, 2015a, 2015b); Starr (2013) Ch. 3 & 6; Clarke (2020) Ch. 2 Lab # 1	HA # 1 31 Aug
BLOCK 2 – Geoscience Basics	Week 3 7-10 Sep 6 Sep is a university holiday	Importance 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. Introduction of Esri platforms in these roles.	Starr (2013) Ch. 4, 5, & 7; NGA and USGIF additional assigned readings; Clarke (2020) Ch. 3 & 5 Homework Assignment # 2 & Register for GEOINT Symposium	Lab # 1 7 Sept

BLOCK 3 – Spatial Data Collection	Week 4 13-17 Sep	Geospatial Intelligence Building Blocks Introduction to the ways in which fundamental geographic information science principles and the accompanying geospatial technologies (GIS, GPS, photogrammetry, remote sensing, and sensor networks) have been used for disaster management, humanitarian assistance, and intelligence problem-solving.	Corson & Palka (2004); Clarke (2020) Ch 6; USGIF (2018); NGA (2018) Ch. 1	HA # 2 14 Sept
			Lab # 2	
	Week 5 20-24 Sep	Navigation and Geolocation Continued discussion of fundamental geographic information science principles and the accompanying geospatial technologies. Navigation and Geolocation are explored in detail.	Palka et al. (2005); Clarke (2020) Ch. 4 & 7	Lab # 2 21 Sept
			Homework Assignment # 3	
	Week 6 27 Sep –1 Oct	Spatial Data Collection (Overhead Systems) Continued discussion of fundamental geographic information science principles and the accompanying geospatial technologies. Overhead data collection systems are explored in detail.	USGIF’s State of GEOINT (2017 & 2018); NGA (2018) Ch. 2 Clarke (2020) Ch. 8 & 9	HA # 3 28 Sept
			Report on GEOINT Event	

<p>Week 7</p> <p>4-8 Oct</p>	<p>Spatial Data Collection (Visible) and GEOINT Symposium</p> <p>Methods and approaches for linking legacy geospatial datasets and visible imaging systems with other kinds of information to yield useful spatial intelligence. Virtually attend GEOINT Symposium.</p>	<p>USGIF's State of GEOINT (2019 & 2020); NGA (2018) Ch. 2 (cont); Clarke (2020) Ch. 10</p> <hr/> <p>Final Project Intro</p>	<p>Report</p> <p>8 Oct</p>
<p>Week 8</p> <p>11-15 Oct</p> <p>10/14-10/15 is a university holiday</p>	<p>Midterm</p> <p>Prepare for, take and submit MIDTERM Exam.</p>	<p>Slides from previous lectures</p>	<p>Midterm Exam</p> <p>12 Oct</p> <p><i>(no other work is due)</i></p>
<p>Week 9</p> <p>18-22 Oct</p>	<p>Spatial Data Collection (Spectral Imaging – Radar – LiDAR)</p> <p>Methods and approaches for collecting and linking evolving sensor suites with other kinds of information to yield useful spatial intelligence. In addition, explore visible and spectral imaging systems.</p>	<p>NGA (2018) Ch. 2 (cont); Clarke (2020) Ch. 11 & 12</p> <hr/> <p>Homework Assignment # 4</p>	<p>Final Project Proposal</p> <p>21 Oct</p>

BLOCK 4 – Analysis and Visualization	Week 10 25-29 Oct	GEOINT Analysis (Part 1) and Geovisualization - Intro to the information exploitation process and the ways in which standard intelligence methodologies can be utilized to respond to a variety of human security challenges. Additionally, evaluate ways in which the capabilities and characteristics of various systems and unmanned aerial vehicles can be used for feature extraction and linked to specific disaster management, humanitarian assistance, and intelligence problem-solving tasks.	NGA (2018) Ch. 3; Defense Industrial Base Sector Protection Plan (Ex Sum); Clarke (2020) Ch. 13 Clarke (2013)	HA # 4 26 Oct	
			Lab # 3		
	Week 11 1-5 Nov	GEOINT Analysis (Part 2) and Geovisualization - Gathering Geospatial Data from Social Media Feeds and other non-traditional methods are explored. In addition, methods and approaches for analyzing data are examined. Finally, geovisualization and the creation and distribution of actionable information is reviewed.	NGA (2018) Ch. 3-4; Esri, <i>GIS in Defense Installation and Environmental Management</i> ; Clarke (2020) Ch. 14 & 15; Klein (2006)	Lab # 3 2 Nov	
		Homework Assignment # 5			
Week 12 8-12 Nov	Tradecraft and Intelligence Agencies - The role of tradecraft is reviewed. A discussion of intelligence agencies will also be addressed.	NGA (2018) Ch. 5; Crooks, et al. (2013); Clarke (2020) Ch. 16, 17, & 18	HA # 5 9 Nov		
		Lab # 4			

BLOCK 5 – Intelligence Products and Future Opportunities	<p>Week 13 15-19 Nov</p>	<p>Geospatial Intelligence Products and Communication (Part 1) The role and character of disaster management, humanitarian assistance, and intelligence briefs, imagery and area reports in human security applications by exploring the use of rapidly evolving, interactive and dynamic decision support products.</p>	<p>NRC (2007) Ch. 1-4; USGIF (2017); Clarke (2020) Ch. 19</p> <hr/> <p><i>Continue to work on Final Project</i></p>	<p>Lab # 4</p> <p>16 Nov</p>
	<p>Week 14 22-23 Nov 11/24-11/28 is a university holiday</p>	<p>Geospatial Intelligence Products and Communication (Part 2) The role and character of disaster management, humanitarian assistance, and intelligence briefs, imagery and area reports in human security applications by exploring the use of rapidly evolving, interactive and dynamic decision support products. A continued discussion of production agencies will also be addressed.</p>	<p>NRC (2007) Ch. 5-6; Fleming, et. al. (2009) x 2</p> <hr/> <p><i>Continue to work on Final Project</i></p>	<p>Review progress of final projects with faculty team</p>
	<p>Week 15 29 Nov -3 Dec</p>	<p>The Future - 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</p>	<p>Treverton (2008); Clarke (2020) Ch. 20</p>	<p>Final Projects</p> <p>30 Nov and 2 Dec</p>

		datasets in a variety of human security settings.		
	Final Exams 8-15 Dec	Final Exam Students complete in-class final exam		Final Exam Thursday 9 Dec 11 AM-1 PM

Summary of Deliverable Due Dates:

Major Requirement	Date Due	Date Assigned
Homework Assignment (HA) # 1	31 Aug	23 Aug
Lab # 1	7 Sep	27 Aug
Home Assignment # 2	14 Sep	3 Sep
Lab # 2	21 Sep	10 Sep
Home Assignment # 3	28 Sep	17 Sep
Symposium Report	8 Oct	24 Sep
Midterm Exam	12 Oct	24 Aug
Home Assignment # 4	26 Oct	15 Oct
Lab # 3	2 Nov	22 Oct
Home Assignment # 5	9 Nov	29 Oct
Lab # 4	16 Nov	5 Nov
Final Project	30 Nov/2 Dec	5 Oct
Final Exam	9 Dec	24 Aug

NOTE: All assignments are due for turn-in at **9:30 AM [PT]** on the assigned date. As currently planned, most all out-of-class work (homework assignments, reports, and labs) are due on Tuesdays.

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” <https://policy.usc.edu/files/2020/07/SCampus-Part-B-1.pdf>. 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

campussupport.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.