San José State University

College of Social Sciences/Department of Urban and Regional Planning
Geography 186, Field Study in Physical Geography, 28728, Spring 2020

Course and Contact Information

Instructor:	Dr. Aharon de Grassi
Office Location:	Washington Square 111
Office Telephone:	(408) 924-542
Email:	aharon.degrassi@sjsu.edu
Office Hours:	Mondays, 11:30 am -12:30 pm
Class Days/Time:	Mondays, 1:30 pm - 4:15 pm
Classroom:	WSQ 113
Units:	3
Type:	Supervision

Course Format

The course will involve a mixed format including lecture, in-class discussion and exercises, assignments, individual field research work, and collective field exercises.

Faculty Web Page and MYSJSU Messaging

You can find all course resources on the GEOG 186 Canvas webpage using your 9-digit SJSU ID and password. Please check the website frequently for updated materials and communication. I will also send out emails directly to you via mysjsu. Please read this email as soon as you receive it since it will most likely contain important/updated information or additional instructions regarding an assignment and so on.

Course Description [catalog]

Field research methods in physical geography, including biogeography, hydrology, soils, geomorphology, and human-environment studies. Mapping, GPS, landscape remote sensing, and field measurements. Local field trips and projects tailored to class interests.

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

1) Understand the different sub-fields of physical geography, their interaction in the world, and their requirement for different methods and equipment for field study.

2) Demonstrate and analyze knowledge of the facts, processes, equipment and methods of field study in physical geography.

3) Prepare written and verbal presentations that report their geographical discoveries through analyses of appropriate documents, primary data, and/or archival data.in professional/technical styles.

4) Prepare maps and other geographical graphics that report their discoveries through analyses of appropriate documents, primary data, and/or archival data.

5) Explain that solving geographical problems is based on experiential analyses of primary and archival data through the methods of the sciences and social sciences.

Texts/Readings (Required)

Textbook

There is no single textbook for the class. Individual PDFs will be available on Canvas. We will be readings a few chapters from the following text, and I would encourage students interested in following up to explore the book further: Montello, Daniel R., & Sutton, Paul C. (2012). *An Introduction to Scientific Research Methods in Geography and Environmental Science,* Thousand Oaks: Sage Publications.

Other Readings

Most weeks will also have a short journal article, definition, newspaper or magazine article, or book chapter to read. Additional short pieces may be handed out in class or posted on Canvas as the semester proceeds.

You are expected to have done the readings for the week by the time of the class meeting (including watching videos, where listed). I will briefly mention the next week's readings at the end of each class, in order to help you navigate through the pieces. Pay careful attention to the page numbers for the readings. There may be in-class exercises that count towards your grade based on the reading for that week.

Supplementary:

For further clarification of ideas, terms, theories, and perspectives, you should also actively consult the various dictionaries, guides and encyclopedias available. These often have different coverage and quality, so it can be useful to consult more than one.

Clifford, et al (2016) *Key Methods in Geography*, London: Routledge.

Watts, Simon, and Lyndsay Halliwell, eds (1996) *Essential Environmental Science: Methods & Techniques*, London: Routledge.

Mayhew (2015) *A Dictionary of Geography*, online.

Warf, Barney, ed. (2010) *Encyclopedia of Geography*, Sage http://sk.sagepub.com.libaccess.sjlibrary.org/reference/geography

Other technology requirements / equipment / material

You will need to activate your ESRI account online. Your ESRI account will be requested by the Instructor from the ecampus director.

Course Requirements and Assignments

Grading Information

GEOG 186 is graded on a Credit/No Credit (CR/NC) basis. To receive a grade of Credit for GEOG 186, students must obtain the equivalent of a grade of C or above () based on a combination of these requirements:

Requirement	**Percentage of Grade**
Class Participation	10%
Mid-Term Exam	20%
Assignments	20%
Individual Project Report	50%

Grade Scale

Percent	Letter Grade	Percent	Letter Grade
95-100	A	77-79	C+
90-94	A-	74-76	C
87-89	B+	70-73	C-
84-86	B	60-69	D
80-83	B-	<60	F

Component	***Description***	***% of grade***	***component %***
PARTICIPATION			10%
due tbd	5 in-class exercises	1% each	
due: see below	5 field exercises	1% each	
MID-TERM EXAM			20%
(due March 23)	5 Short Answers	10% (2% each)	
	2 Short Essay Questions	10% (5% each)	
ASSIGNMENTS			20%
due Feb 2 (approx.)	Article on methods	1%	
due Feb 16 (approx.)	Draft Project Proposal	1%	
due March 2	Revised Project Proposal	5%	
due April 27	Field Notes	5%	
due May 4	Map Draft	3%	
due May 7	Report Draft	5%	
PROJECT REPORT			50%
(due May 19)	Formatting	3%	
	Length	3%	
	Writing (Tone, SpellCheck)	3%	
	Introduction	5%	
	Methods	5%	
	Equipment	5%	
	Discussion	5%	
	Conclusion	5%	
	Consistency of QMDE	5%	
	Map	3%	
	References	3%	
TOTAL:			*100%*

Participation (10%)

Your participation grade will be based on participation in 5 in-class exercises (2% each, for a total of 10%), and 5 field exercises (2% each, for a total of 10%).

Students are expected to attend all the classes and to arrive on time. Your active participation in discussion is a key component of this course. The weekly schedule is condensed, and consequently it is crucial that students keep up with the concepts and material in the course – discussion is one of the most important ways to do this because it allows students to clarify, compare, and deepen their understanding [CLOs 1, 3, 5].

We will be doing exercises in-class and in the vicinity of campus that will assist students in learning concepts and methods, and applying those methods in practice. Locations will be announced ahead of time as soon as possible. If you are unable to make the field exercise, please contact the instructor ahead of time to make an alternative arrangement (only in an exceptional circumstance if need be, you may schedule a suitable time to do it on your own, or there are lots of related events around the area).

The dates for the field exercises are [CLOs 1, 2]:

1) March 9 – Geomorophology & Soils
2) March 16 – Hydrology & Water
3) March 23 – Climatology & Air Quality
4) April 6 – Biogeography
5) April 13 – Topography

Optional/Tentative:

- April 20 – Earth Day Events
- April 27 – Drones, City Nature Challenge, BioBlitz, or other Earth Day events

Exam (20%)

Due: March 23rd 12pm via Canvas
A take-home exam will ensure progress in comprehension of the readings and lecture material [CLOs 1, 2, 5]. The exam will not have any surprises outside of this material, and there will be a brief review session with opportunity for questions and answers during regularly scheduled class one week prior to the exam. The exam will involve two Parts. Part A has 5 short answer questions (worth 2% each, for a total of 10%). Part B involves two short essay questions (worth 5% each, for a total of 10%).

Assignments (20%)

The assignments are designed to ensure comprehension of reading and lecture, and also to assist with timely preparation of the final research project. Further details about the requirements for each assignment will be posted on Canvas at least several weeks before the due date. Assignments 1 & 2 with approximate deadlines will not be penalized for late submissions. If you are unable to meet the deadlines, please contact the Instructor with at least 1 week notice beforehand.

#	Topic	Due	%	CLOs
Assignment 1	Find & Describe Related Article	February 2 (approx.)	1%	1, 2, 5
Assignment 2	Initial Draft Project Proposal	February 16 (approx.)	1%	1, 2, 5
Assignment 3	Revised Project Proposal	March 2	5%	1, 2, 5
Assignment 4	Field Notes	April 27	5%	2, 3
Assignment 5	Map Draft	May 4	3%	3
Assignment 6.	Report Draft	May 7	5%	3, 4, 5

Individual Research Project (50%)

Throughout the course, you will be working on a research project, with a final report due **May 19th 12:00 pm via Canvas** [CLOs 1, 2, 3, 4, 5]. For detailed percentages, see the overall grading table above. Further details on each of the components of the Project Report will be provided in class (students are also encouraged to consult the guidance on report structure in Montello & Sutton pp. 70-4, which will be provided in class and on Canvas).

The report must be at least 6 pages (double spaced, Times New Roman 12pt, 1-inch margins) – excluding tables, pictures, references, and any optional appendices. The project should involve clear links between (1) topic/question (addressed in your Report's Introduction), (2) data to answer that question, (3) methods to acquire that data, and (4) equipment utilized for those methods. To ensure students are making progress with the Research Project design, implementation, and analysis, several assignments will also be associated with the project. Students will receive feedback on a draft report to be able to make revisions prior to submitting the final report.

For information specific to your research topic, please consult the readings for the respective week ahead of time. If relevant, please also see the Supplementary Resources. You will also need to do your own independent research – you are encouraged to consult with each other, with the Instructor, with the geography librarian, and/or with other experts on campus or elsewhere. Students can also speak with the professor to refine the research project and locate useful literature and guides.

After consultation and approval with the instructor, you may also design your project by building on or contributing to a relevant project listed in the Community Science for CA Naturalists database of the University of California (https://calnat.ucanr.edu/California_PPSR/). This EPA listing may also be helpful: https://www.citizenscience.gov/catalog/#

Two or three students may work together on a single project, however the requirement remains of at least 10 pages per person AND collective papers must be cohesive (not separately written sections stitched together), and will receive a single grade.

You will share the conclusions of your project with the class in a brief (5-10 minute) presentation, which will count as an in-class exercise towards your participation grade.

The final research project report will be evaluated primarily using following list of criteria:

1. Is the research question and/or goal well defined and clearly stated?
2. Does the author discuss relevant issues and literature on the subject?
3. Is the methodology appropriate to answer the research question(s)?
4. Is the collected data sufficient in quality and depth to answer the research question?
5. Is the discussion direct, competent, and appropriate?
6. Are the conclusions based on the results of the analysis, as a logical extension of the findings?
7. Is the material logically organized, so that a reader can easily follow the writer's train of thought?
8. Is the writing grammatically correct and free of typos?
9. Do tables and figures add useful/important information for the reader?
10. Are citations included where appropriate, and are footnotes and bibliography properly formatted?

Late or Missed Work

Late work will be accepted. Assignments 1 & 2 listed with an (approx.) due date will not be penalized for late submissions. For all other work, if there is a documented reason, there will be no penalty for late work. Otherwise, late work will be penalized by 1% for each week late. This does not apply to the final Research Project Report, which must be submitted by May 19th and no late report will be accepted except for documented emergencies.

University Credit Hour Requirement

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Final Examination or Evaluation

While there is no Final Exam for the class (as specified in SJSU Senate Policy S17-1, "Supervision, Internship and individual study courses are not required to have a culminating activity."), the Final Research Project Report will be an important concluding achievement, and students will have the opportunity to briefly share their project and results with the class in a short presentation on the final day of regular class on May 11.

Classroom Protocol

As your professor, I make a concerted effort to be prepared to class and to conduct ourselves in a responsible and professional manner. While I know that emergencies can arise, I expect the same from you – that you arrive on time, read the materials, and are ready to participate in the day's activities. I encourage you to take notes either in writing or on a computer, but ask that you not multitask, surf the web or use cell phones while in class so that your full attention is devoted to our in-class activities and discussion. While missing a class should not adversely impact your grade, missing a few could have a negative impact, as there will be intermittent in-class assignments and activities in which you will be expected to participate.

University Policies (Required)

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/"

Detailed Course Description:

This course is an opportunity to get outside and put into practice skills, concepts, and techniques in a real-world context. This course engages student in the process of organizing and implementing a research project in physical geography. Specifically, students will investigate patterns of temperature, humidity, wind speed, or other physical and social attributes. Handheld devices and field notebooks will be used to gather data at specific locations and times. Students will investigate a range of topics central to physical geographic field work, including the effects of sampling schemes, instrumental constraints, biases, uncertainties, and hypotheses.

Other Issues

Accommodation

If you need special arrangements, please send me an email or speak with me privately after class or in office hours. It is important to speak with me sooner rather than later in order to be able to accommodate you in an appropriate and timely manner.

Library Resources

To succeed in this course, you need to access academic materials from the library. Some can be done online. Please familiarize yourself with how to get online access to academic journals, reference databases, and e-books via the library. You can ask the librarians and fellow students, do an internet search, or chat in office hours. The geography librarian is Nyle Monday, Nyle.Monday@sjsu.edu

Formatting

All assignments and texts should be submitted formatted to double space, 12-point font, Times New Roman, 1-inch margins.

Equipment

We will be using a range of equipment in this class. Manuals for Equipment will be posted on Canvas.

We will be using Garmin GPS MAP 64 devices, and their Bluetooth connectivity via the Garmin Connect App. The Garmin GPS device manual can also be downloaded here:
https://support.garmin.com/support/manuals/manuals.htm?partNo=010-01199-00&language=en&country=US

Students are also encouraged to use mobile devices of one sort. If you prefer not to use your own personal mobile device, or would prefer one of a different size, specs, or with a different operating system (Android or iOS), let the instructor know as soon as possible. The class will discuss differences, advantages and disadvantages of various types of mobile devices.

It may also be possible for the Department to acquire equipment specific to your research project. Students should rank potential equipment (based on initial student responses regarding research project interests), and these rankings will be used to purchase equipment based on importance and cost. You may wish to make arrangements to purchase additional affordable equipment.

You may find examples of equipment listed in Montello & Sutton, as well as here:

- (2015) 'Field Research Equipment Inventory,' Berkeley, University of California, Geography Department, January 16, 2pp. https://geography.berkeley.edu/sites/default/files/field-research-equipment-inventory.pdf
- (2015) 'Geography Department Survey Equipment,' Berkeley, University of California, Geography Department, January 15, 4pp. https://geography.berkeley.edu/sites/default/files/geog-survey-equipment-inventory.pdf

If you would like to make arrangements for using equipment outside the department, please contact the Instructor with information and details as soon as possible. It may be possible to borrow equipment from other Departments at SJSU or other people and organizations, but there are no guarantees about this possibility (particularly because many kinds of equipment can be quite expensive).

Here are some examples of relevant equipment (and some rough low-cost informational estimates) that may be available or worth considering (purchases are NOT required for the class):

Temtop M2000C Air Quality Monitor	$166
VIVOSUN pH and TDS Meter Combo VIVOSUN pH and TDS Meter Combo	$18
Atree Soil pH Meter, 3-in-1 Soil Tester Kits	$15
Ambient Weather WS-2902A Weather Station	$170
Sighting Compass	$13
Zozen Collapsible Measuring Wheel	$22
Stake Flags - 100 Pack	$13
LOMVUM Laser Measure 393Ft	$37
Komelon 6622IM Fiber Reel Long Open Reel Tape Measure	$18
Increment Tree Borer	$100
Wildlife Camera	$40
LaMotte Garden Kit	$30
Soil Sample Probe	$60
Abney Clinometer	$35
BTMETER Digital Anemometer BT-100WM	$40
MJP Stream Flowmeter	$250

Software

The primary software that we will be using for the class is ArcGIS and Arc Collector. Students require ESRI licenses for these – to resolve any issues, please contact me and/or the ecampus director Jennifer Redd (jennifer.redd@sjsu.edu). Links and documents to facilitate using these can be found online and some examples and useful resources will also be posted on Canvas. Various equipment may also require specialized software (such as Garmin Connect).

Course Etiquette & Policy on Devices in Class

Allowed:

- ✓ Using your computer if you sit in the rear row
- ✓ Taking class notes on your computer
- ✓ Consulting readings on your computer

NOT Allowed:

- × Using your computer for something not directly related to the class discussion
- × Recording audio/video without explicit permission
- × Having your cell phone out or visible on the table
  - × no texting
  - × no using your cell phone

  {unless you are demonstrably using it briefly to immediately address a specific question or issue in class}

If you are using your computer for anything other than taking notes, it will affect your participation grade. You will only get an initial warning, a final warning, and then will not be allowed to use devices for the remainder of the course.

Please be respectful and considerate with your fellow students and your classroom community – if you are doing non-class activities then you will distract people sitting nearby and diminish their learning. Also respect yourself and give yourself a break from the internet – university courses are unique valuable, once-in-a-lifetime opportunities to think deeply, challenge yourself, and learn with your fellow students.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

University Policies

"**University Policies:** Office of Graduate and Undergraduate Programs **maintains university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc.**"
You may find all syllabus related University Policies and resources information listed on GUP's Syllabus Information web page at http://sjsu.edu/gup/syllabusinfo/

Overview of Course Schedule:

Week	Date	Topic	Assignments / Exams
1	January 27	Introduction to the Course	
2	February 3	Participatory Research, Citizen Science, Environmental Justice, and Critical Physical Geography	
3	February 10	Equipment and Project Topics	
4	February 17	Projects I: Proposal Review; ArcGIS Online & ArcCollector	Assignment Due: Draft Project Proposal
5	February 24	Projects II: Proposal Review; ArcGIS Online & ArcCollector	
6	March 2	Field Practice & Sampling	Assignment Due: Revised Project Proposal
7	March 9	Geomorphology, soils	
8	March 16	Hydrology/Water	
9	March 23	Climatology & Air Quality	Mid-Term Exam Due
10	March 30	Spring Break	
11	April 6	Biogeography	
12	April 13	Topography & Cartography	
13	April 20	Integrating with remote imagery	
14	April 27	Drones	Assignment Due: Field Notes Option: City Nature Challenge
15	May 4	Ethics, Practices, Science	Assignment Due: Draft Map
	May 7		Assignment Due: Report Draft
16	May 11	Final Review, Q&A, Project Presentations	
17	May 19	Final Project Report Due	

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This schedule is subject to change with fair notice so please check Canvas for latest course information.

Week	Date	Topics, Readings, Assignments, Deadlines

1	1/27	INTRODUCTIONS & OVERVIEWS
		
		• Instructor introduction
		• Class introductions
		  ○ Backgrounds
		  ○ Interests
		  ○ Potential Projects
		
		• Class discussion
		  ○ Individual vs group projects
		  ○ Budget & equipment

2	2/3	INTERCONNECTIONS BETWEEN PHYSICAL GEOGRAPHY AND SOCI-POLITICAL ISSUES Participatory Research, Citizen Science, Environmental Justice, and Critical Physical Geography For a tangible example dealing with physical geography field methods' relationship with social and policy issues, we will be considering the example of lead-polluted water in Flint Michigan, which is the subject of the SJSU Campus Reading Book for Fall 2020, What the Eyes Don't See by Dr Mona Hanna-Attisha (http://www.sjsu.edu/reading/book_current/): In class videos: • Tufts ENV (2017) 'Environmental Justice: Lead Poising in Flint, Michigan,' June 13, 4:52 https://www.youtube.com/watch?v=eEIli9yAUDQ • PBS Newshour (2019) 'Why Flint Residents are Still Dealing with Water Worries, 5 Years After Lead Crisis,' October 2019, 6:43 https://www.youtube.com/watch?v=rNlLHXglPfo • Pulido, Laura (2015) 'Environmental Racism,' KTH Environmental Humanities Laboratory, August 25, 8:28 [just audio, the video is very shaky], https://www.youtube.com/watch?v=reP7awDdeRk In class readings for small group & class discussion: • Lave, Rebecca. (2016). Stream restoration and the surprisingly social dynamics of science. *WIREs Water*, 3(1), 75-81. • Berry, L. et al (2019) 'Making Space: How Public Participation Shapes Environmental Decision-Making,' Stockholm Environment Institute, Discussion Brief, pp 1-8. Assignment Due: Field Methods Article Consult the list of journals on pages 61-3 in Montello & Sutton relevant to field methods in physical geography. Search for an article focused on your topic of interest. Describe the methods and equipment that that study used.

3	2/10	RESEARCH TOPICS & EQUIPMENT Topics: • Different kinds of equipment • Relationships between research Questions, Data, Methods, & Equipment (QDME) Reading: • Montello & Sutton, Chapter 5: Physical Measurement, pp. 94-117. • Choose one chapter (at least) from Lave et al. *Handbook of CPG* Due: Budget Survey • Rank in order of preference for your potential research project the items from the link in Canvas to the online survey • This will help to determine how we allocate the budget for equipment for the class

4	2/17	RESEARCH DESIGN & DATA COLLECTION SOFTWARE
		
		Reading:
		• Montello & Sutton, Chapter 2: Fundamental Research Concepts, pp. 39-59.
		• ESRI Collector App Producer Manual
		• For Online Support with ArcGIS Online, see:
		  ○ https://mdl.library.utoronto.ca/technology/tutorials/introduction-arcgis-online
		  ○ https://doc.arcgis.com/en/arcgis-online/reference/whats-new.htm
		
		In-class exercises:
		• Closed System: ArcCollector
		  ○ Download to device
		  ○ Log In
		
		• (Open / Less Closed):
		  ○ Download:
		  ▪ Map Plus (for iOS)
		  • Or an alternative that allows you to create and share waypoints
		  ▪ QField (for Android)
		  ○ Email me a KMZ file for our current location
		
		Assignment Due: Draft Project Proposal

5	2/24	RESEARCH STRUCTURE & ARC COLLECTOR Topics: • Research Design Process (QMDE) • Sampling Methods • Resources for • Updates on Equipment • Updates on Arc Collector

		Reading: • Montello & Sutton, Chapter 9: Sampling, 201-227.
6	3/2	FIELD PRACTICE & SAMPLING Readings: • ArcCollector Manual (see above) • Please make sure you have watched one of the Arc Collector Training Videos by ESRI or others (links are also on Canvas): o https://www.esri.com/training/catalog/57eb17c0ee85c0f5204b9c14/collector-for-arcgis%3A-an-introduction/ or here: https://www.youtube.com/watch?v=RJHHaEHdHBE o https://www.esri.com/training/catalog/5b9832af6bda0864767b1188/field-data-workflows-with-collector-for-arcgis/ o https://www.youtube.com/watch?v=DFF4XkWEKsM • Rayback, Shelly (2016) 'Making Observations and Measurements in the Field,' in Clifford et al. (eds) *Key Methods in Geography*, Los Angeles: SAGE, pp. 325-335. • Robbins, P. (2010) 'Human-Environment Field Study,' in Gomez and Jones (eds) *Research Methods in Geography*, 241-256. Supplementary: • Dyckhoff et al. (1996) 'Sampling,' in Watts & Halliwell, eds *Essential Environmental Science*, 32-66. Equipment: • Mobile Devices • Lab Desktops Assignment Due: Revised Project Proposal
7	3/9	GEOMOROPHOLOGY & SOILS Watch: • Soil Sampling: o Noble Research Institute (2014) 'How to Take a Soil Sample,' August 11, 8:24, https://www.youtube.com/watch?v=3_U9Z3fy0Ig o Pioneer Seeds (2013) 'Types of Soil Sampling Devices,' November 14, 1:39, https://www.youtube.com/watch?v=jAVLXHrlp7Y o NS Perennia (2013) 'Collecting Soil Samples,' Jan 9, 5:25, https://www.youtube.com/watch?v=TYo9htjBo88 • Soil Classifying: o Rebecca Graham (2017) 'Lecture on Classification of Soil in the Field,' April 30, 10:24, https://www.youtube.com/watch?v=S4MbLtDhruU • Soil Surveying: o Carri Khouzani (2019) 'Soil Survey and Mapping,' May 15, 7:20, https://www.youtube.com/watch?v=7fGPo2xhp4Y

		○ [skim] Society of Economic Geologists (2019) 'Design and Implementation of a Soil Survey Program,' November 14, 1:15:00, https://www.youtube.com/watch?v=XGVfUXkK5hc ○ And/or others … Readings: • Chen et al 2015 'Soil Sampling Methods,' 1-2. • 'Soil Sampling' and 'Soil Surveys' in Eash et al (2015) *Soil Science Simplified*, Chichester: Wiley, pp. 140-143 and 257-262. • 'Soils in the Field,' pp. 1-16 in Rowell, David (2014) *Soil Science: Methods & Applications*, London: Routeldge. • 'Field Description and Morphological Mapping, Geomorphometry, Digital Elevation Models, & Remote Sensing,' in Huggett et al (2017) *Fundamentals of Geomorphology*, pp. 51-7. • Schrott et al. (2013) 'Fundamental Classic and Modern Field Techniques in Geomorphology: An Overview,' in Shroder et al. (ed) *Methods in Geomorphology*, San Diego: Academic Press, pp. 6-21. Supplementary: • USDA Web Soil Survey https://www.youtube.com/watch?v=QRSipAAYQ1w and https://www.youtube.com/watch?v=fzpKPIJajdQ • 'Soil Classification and Survey' and 'Soil Sampling and Testing,' in Plaster, E. (2013) *Soil Science & Management*, Cengage, pp. 47-66 and 306-321. • Haigh, Martin, and Clinton Dyckhoff (1996) 'Soils,' in Watts and Halliwell, eds, *Essential Environmental Science*, 269-305. • Bradley A Miller, Eric C Brevik, Paulo Pereira, Randall J Schaetzl (2019) Progress in soil geography I: Reinvigoration, *Progress in Physical Geography* 43(6). • McClintock, N. (2015). A Critical Physical Geography of urban soil contamination. *Geoforum* 65: 69–85. • Rowell, David (2014) *Soil Science: Methods & Applications*, London: Routeldge. • Goudie, Andrew (ed) (2003) *Geomorophological Techniques*, London: Routledge. • Thorbush et al. (2014) *Geomorphological Fieldwork*, Elsevier. Field Visit: • Guadalupe River Park or tbd Equipment: • Mobile Devices • Soil Probe • Optional: Soil Sample Containers
8	3/16	HYDROLOGY & WATER Field Visit: • Coyote Creek • For more background, see:

- Tampa Aerial Media (2017) 'San Jose, CA - Coyote Creek,' Feb 11, 3:31, https://www.youtube.com/watch?v=4uKiIMNRxs8
- KPIX CBS SF Bay Area (2017) 'Flood Protection May Be Finally Coming To Coyote Creek in San Jose,' June 12, 2:47, https://www.youtube.com/watch?v=J2jG0roKGD8
- Various resources from: https://en.wikipedia.org/wiki/Coyote_Creek_(Santa_Clara_County)

Equipment:

- Measuring tape
- Mobile device
- Water sampling containers (& labeling tape & pen)
- VIVOSUN pH and TDS Meter Combo VIVOSUN pH and TDS Meter Combo

Readings:

- Desloges, J. 'Stream Discharge Measurements,' pp. 19-23, in Chen et al. 2015.
- Finkelstein et al. 'Water Quality,' pp. 26-32 in Chen et al. 2015.

- Watch some of:
  - Water Sampling
    - University of Derby (2010) 'Collection and preparation of water sample,' Dec 20, 2:15, https://www.youtube.com/watch?v=t13XnjQhPlc
    - New York Department of Environmental Conservation (2015) 'Water Sampling Collection,' April 30, 5:14 https://www.youtube.com/watch?v=LDZi56EMyWc
    - New Zealand Landcare Trust (2016) 'Water Quality Sampling,' April 5, 3:53, https://www.youtube.com/watch?v=iB7XY3wD1-E
  - Streamflow Measurement:
    - USEFUL: Ohio University (2017) 'Stream Discharge Measurement,' Jan 18, 12:13, https://www.youtube.com/watch?v=9MpyTopzon8
    - SonTekYSI (2018) 'How Do I Measure the Flow of a Stream? SonTek ADCP and ADV Options,' May 10, 4:46, https://www.youtube.com/watch?v=xRVagxn6Hho
    - Intermountain Environmental (2016) 'Estimating Flow Rate Using the Float Method,'Dec 7, 5:16, https://www.youtube.com/watch?v=4uS9oOTa4PI
    - Shcrader, Rich (2018) 'How to Measure Stream Flow,' Oct 8, 5:37, https://www.youtube.com/watch?v=PXlG9UpHhas
    - And/or other …

Supplimentary:

- 'Measuring Channel Flow,' in Davie and Quinn *Fundamentals of Hydrology*, London: Routledge, pp. 157-176.
  - Can skim 'Streamflow Analysis & Modelling,' ibid, 176-206.
- 'Water Quality,' in Davie and Quinn *Fundamentals of Hydrology*, London: Routledge, pp. 207-232.
- Jenkins et al. (1996) 'Waters,' in Watts and Halliwell, eds, *Essential Environmental Science*, 306-356.

9	3/23	CLIMATOLOGY & AIR QUALITY
		
		Mid-Term Exam Due
		
		Field Visit:
		• Classroom, & walk nearby SJSU Campus
		
		Equipment:
		• Temtop M2000C Air Quality Monitor
		• BTMETER Digital Anemometer BT-100WM
		• Mobile device
		
		Watch:
		• Science at Nasa (2016) 'Monitoring Air Quality,' June 27, 4:51, https://www.youtube.com/watch?v=qkY5oFQD2cc
		• GSMA (2018) 'Smart London – Air Quality Monitoring with IoT Big Data,' April 9, 3:43, https://www.youtube.com/watch?v=L06Btv0SXcI
		• ACM (2017) 'Community-Empowered Air Quality Monitoring System,' May 2, 0:30, https://www.youtube.com/watch?v=5Md9rSCb1QQ
		• Grist (2019) 'How to Build a DIY Air Quality Sensor,' September 10, 5:24, https://www.youtube.com/watch?v=M2Y9n6fhoxI
		
		Readings:
		• 'Outdoor air pollution measurement methods,' pp. 50-52, in IARC (2016) *Outdoor Air Pollution*, Lyon, https://www.ncbi.nlm.nih.gov/books/NBK368020/ [full book freely available online].
		• Cardinal, David (2018) 'How Air Quality and the AQI are Measured,' 5pp. https://www.extremetech.com/electronics/280956-how-air-quality-and-the-aqi-are-measured
		• EPA (nd) 'Air Monitoring, Measuring, and Emissions Research,' https://www.epa.gov/air-research/air-monitoring-measuring-and-emissions-research
		• 'Monitor air quality with a Raspberry Pi,' https://www.raspberrypi.org/blog/monitor-air-quality-with-a-raspberry-pi/
		• See Physical Geography Chapter for refresher
		• Have another look at:
		  ○ EPA My Environment
		  ○ Weather Underground weather stations around San Jose
		
		Supplementary:
		• 'Air Quality and Emissions Assessments,' pp. 217-256 in Godish (2003) *Air Quality*, CRC Press.
		• Whalley and Zandi (2016) 'Particulate Matter Sampling Techniques and Data Modelling Methods,' in Sallis (ed) *Air Quality: Measurement and Modeling*, 35-60.
		• IARC (2016) *Outdoor Air Pollution*, Lyon [full book freely available online] https://www.ncbi.nlm.nih.gov/books/NBK368020/
		• See also: https://www.sciencedirect.com/topics/earth-and-planetary-sciences/air-quality-monitoring

10	3/30	SPRING BREAK – NO CLASS
11	4/6	BIOGEOGRAPHY Field Visit: • tbd Equipment: • Mobile Devices • Measuring tape • Field Guide (optional) • Binoculars (optional) • Sampling containers (optional) Reading: • Vegetation Sampling Methods, 38-55, in Chen et al 2015. • Gillespie, Thomas and Glen MacDonald (2010) 'Vegetation,' in Gomez and Jones (eds) *Research Methods in Geography*, Chichester: Wiley, 93-115. Videos: • iNaturalist (2018) 'How to Make an Observation on iNaturalist using our Mobile App,' May 3, 1:24, https://www.youtube.com/watch?v=xENz1xRu0wI • Skim also the iNaturalist playlist for other videos of interest: https://www.youtube.com/channel/UC16Di6Bbo1BeXqp9Ii5uqlg/videos • Also skim for other helpful videos about using iNaturalist: https://www.youtube.com/results?search_query=inaturalist Supplementary: • Reid, Margery and Stewart Thompson (1996) 'Ecological Fieldwork Methods,' in Watts and Halliwell, eds, *Essential Environmental Science*, 357-390. • De Nevers, Greg (2013) *The California Naturalist Handbook*, Berkeley, University of California Press, online at : https://na03.alma.exlibrisgroup.com/view/action/uresolver.do?operation=resolveService&package_service_id=33676319130002901&institutionId=2901&customerId=2900
12	4/13	TOPOGRAPHY & CARTOGRAPHY Field Visit: • Alum Rock Park, Heller County Park, or tbd Equipment: • Compass • Map • Mobile Device

		Readings: • Finklestein et al 'Surveying Methods,' pp. 61-81 in Chen et al 2015. • Skim: Supplementary: • Tovey, Keith (1996) 'Surveying,' in Watts and Halliwell, eds, *Essential Environmental Science*, 135-224. • Nadolinets, L. et al. (2017) *Surveying Instruments and Technology*, Boca Raton: CRC Press.
13	4/ 20	REMOTE IMAGERY [if time] Location: • Alum Rock Park, Heller County Park, or tbd Equipment: • Mobile devices Readings: • tbd Supplementary: • Wooster et al. (2016) 'Remote Sensing and Satellite Earth Observation,' in Clifford et al., eds *Key Methods in Geography*, 423-438.
14	4/ 27	DRONES Field Visit: • Guadalupe River Park, or William St. Park (tbd) Equipment: • Drone (provided via faculty) Readings: • Drone Manual (tbd) • Web Open Drone Map: Watch the very short video: 'What is WebODM?' 0:44, https://www.youtube.com/watch?time_continue=44&v=N4Zmk9q1qL4&feature=emb_logo • Drone2Map – Watch: Getting Started with Drone2Map for ArcGIS (ESRI.com), 1:30:00. • https://support.dronedeploy.com/docs/making-successful-maps • Altaweel, Mark (2018) 'The Use of Drones in Human and Physical Geography,' GIS Lounge, March 20, 1-4. • Skim: Mapping the Earth: The Dawn of Drone Geography, slides, Reading Group, Cambridge Department of Geography, https://www.geog.cam.ac.uk/research/readinggroups/gisc/Drones_GIScForum.pdf

		Supplementary: • Garrett, Bradley and Karen Anderson (2017) 'Drone methodologies: Taking flight in human and physical geography,' *Transactions of the Institute of British Geographers* 43(3):341-359. • Altaweel, Mark (2017) 'UAVs, GIS, and Ecology,' Nov 12, GISLounge.com • See also additional supplementary resources below Optional: • Lake Merritt BioBlitz (April 25) • SF City Nature Challenge (April 24-27) Assignment Due: Field Notes
15	5/4	ETHICS, PRACTICES, SCIENCE Reading: • Choose one short piece from the additional supplementary resources below, especially citizen science, the field, gender, decolonial approaches, relevance, or science. Supplementary: • Lunn, Jenny (2014) 'Rethinking ethics in field research: Integral, individual, and shared,' in Jenny Lund, ed. *Fieldwork in the Global South: Ethical Challenges and Dilemmas*, London: Routledge, 1-10. • Inkpen, Rob, and Graham Wilson (2013) 'Introduction,' in *Science, Philosophy, and Physical Geography*, London: Routledge, 2nd Edition, 23-32. Assignment Due: Map Draft
	5/7	Assignment Due: Report Draft
16	5/11	FINAL REVIEW • Questions & Answers In-Class Exercise Due: Short In-Class Presentations on Individual Projects
17	5/19	**FINAL PROJECT REPORT DUE 12pm via Canvas**

Supplementary Resources

Citizen Science

Fab Lab Barcelona (2018) 'Documentary: Citizen Science Revolution,' December 7, 1:02:43, https://www.youtube.com/watch?v=hvn5LyACUYw

Boyd, William (2014) 'Citizen Science,' in David Coghlan and Mary Brydon-Miller, eds *The SAGE Encyclopedia of Action Research*, Sage: Thousand Oaks, 98-100.

Cooper, Caren B. (2016). *Citizen Science: How Ordinary People are Changing the Face of Discovery*. New York: The Overlook Press.

Gabrys, Jennifer (2019) *How to Do Things with Sensors*, Minneapolis: University of Minnesota Press.

Hannibal, Mary (2016) *Citizen Scientist: Searching for Heroes and Hope in an Age of Extinction*, New York: The Experiment.

Kobori et al. (2018) 'Citizen Science,' in Brian Fath, ed. *Encyclopedia of Ecology*, Amsterdam: Elsevier, 529-535.

Wynn, James (2017) 'Introduction,' in *Citizen Science in the Digital Age*, Tuscaloosa: University of Alabama Press, 1-11.

Critical GIS

Selections from and reviews of Wilson, M (2017) *New lines: Critical GIS and the trouble of the map*. Minneapolis: University of Minnesota Press

Book Review Forum, Transactions in GIS, 2019, v 23 n1, pp. 158-179
https://onlinelibrary.wiley.com/toc/14679671/2019/23/1

This is Not an Atlas, skim, esp. pp. 46-53, 86-101

Pavlovskaya, Marianna. (2018). Critical GIS as a tool for social transformation. *The Canadian Geographer / Le Géographe canadien*, 62(1), 40-54.

Schurman 2017 Critical GIS in International Encyclopedia.

Canadian Geographer 2018, v 62, n 1: 1-101
https://web-a-ebscohost-com.libaccess.sjlibrary.org/ehost/results?vid=5&sid=9da837d8-529c-42b2-a0d1-66b9eca4069e%40sdc-v-sessmgr01

Decolonial Approaches

Baker, Kate, Eichhorn, Markus P, & Griffiths, Markm. (2019). Decolonizing field ecology. *Biotropica* 51(3), 288-292.

Coombes, Brad, Johnson, Jay T., & Howitt, Richard. (2014). Indigenous geographies III: Methodological innovation and the unsettling of participatory research. *Progress in Human Geography* 38(6), 845-854.

Kershaw, Geoffrey GL, Castleden, Heather, & Laroque, Colin P. (2014). An argument for ethical physical geography research on indigenous landscapes in Canada. *The Canadian Geographer/Le Géographe Canadien*. 58(4), 393-399.

Toomey, A. H..2016. What happens at the gap between knowledge and practice? Spaces of encounter and misencounter between environmental scientists and local people. *Ecology and Society* 21(2), 28.

Whitman, Geoff P, Pain, Rachel, & Milledge, David G. (2015). Going with the flow? Using participatory action research in physical geography. *Progress in physical geography* 39(5), 622-639.

Drones

Anderson et al. (2019) 'Low-budget topographic surveying comes of age: Structure from motion photogrammetry in geography and the geosciences,' *Progress in Physical Geography* 43(2): 163-73.
Drones journal (skim) https://www.mdpi.com/journal/drones

The Field

Alpay, Sam 'Field Safety: Principles, Practice, and Culture,' in Thorbush et al. (2014) *Geomorphological Fieldwork*, Elsevier, 65-90.
Day, Mick 'Preparing for Fieldwork,' in Thorbush et al. (2014) *Geomorphological Fieldwork*, Elsevier, 33-64.
Shroder, John (2010) 'Fieldwork in Physical Geography,' in Warf, B. (ed) *Encyclopedia of Geography*, Thousand Oaks: SAGE.
Stokes, Alison, Anthony D. Feig, Christopher L. Atchison, Brett Gilley (2019) Making geoscience fieldwork inclusive and accessible for students with disabilities, *Geosphere* 15(6): 1809–1825

Gender

Burek, Cynthia V, & Kölbl-Ebert, Martina (2007). Historical problems of travel for women geologists. Geology Today 23(1), 30-32.
Louise, Bracken, & Mawdsley, Emma. (2004). 'Muddy glee': Rounding out the picture of women and physical geography fieldwork. *Area, 36*(3), 280-286.
Madge, C., & Bee, A. (1999). Women, science and identity: interviews with female physical geographers. Area, 31(4), 335–348.
Nash, Meredith, Nielsen, Hanne EF, Shaw, Justine, King, Matt, Lea, Mary-Anne, & Bax, Narissa (2019). "Antarctica just has this hero factor…": Gendered barriers to Australian antarctic research and remote fieldwork. PLOS One *14*(1).
Special Issue on Gender and Geoethics in the Geosciences, Int. J. Environ. Res. Public Health 2016, 13(4).
Sprague, J. (2005) How Feminists Count: Critical Strategies for Quantitative Methods, 95-144, in *Feminist Methodologies for Critical Researchers*.
Thornton, Sarah et al. (2019) 'Pushing the limits': experiences of women in tropical peatland research, Marine and Freshwater Research 71(2) 170-178.

Methodological Discussions & Debates

Bauer, B.O., Winkler, J.A. and Veblen, T.T. (1999) 'Afterword: a shoe for all occasions or shoes for every occasion: methodological diversity, normative fashions, and metaphysical unity in physical geography', *Annals of the Association of American Geographers*, 91: 771–778.
Burt, T. (2003) 'Realms of gold, wild surmise and wondering about physical geography', in S. Trudgill and A. Roy (eds) *Contemporary Meanings in Physical Geography*. London: Arnold.

Physical Geography History and Frontiers

Aspinall, Richard. (2010). A century of physical geography research in the Annals. *Annals of the Association of American Geographers*, 100(5), 1049-1059.

Chen, Jing, Anna Megens, and Pamela Tetfod (2015) 'GGR 390F: Physical Geography Field Camp 2015-2016,' University of Toronto, 84 pp.

Gurnell, Angela (2018). Twenty-five years of progress in physical geography: A personal view of its antecedents and trajectory. *Progress in Physical Geography*.

Physical-Human Geography: Divides & Integration

Castree, Noel (2005) Two Natures? The dis/unity of geography, in *Nature*, Routledge, 177-222.

Dasgupta, Rajarshi, & Patel, Priyank Pravin. (2017). Examining the physical and human dichotomy in geography: Existing divisions and possible mergers in pedagogic outlooks. *Journal of Geographic Research*, 55(1), 100-120.

Goudie, A. (2017) The integration of Human and Physical Geography revisited, *Canadian Geographer*.

Greenhough, Beth 2014 More than human geographies, in *SAGE handbook of human geography*.

Harrison, S., Massey, D. and Richards, K., 2008. Conversations across the divide. *Geoforum*, 39(2), pp.549–551.

Harrison, S., Massey, D., Richards, K., Magilligan, F.J., Thrift, N. and Bender, B., (2004) Thinking across the divide: perspectives on the conversations between physical and human geography. *Area*, 36(4), pp.435–442.

Jones, Phil, & Macdonald, Neil (2007). Getting it wrong first time: Building an interdisciplinary research relationship. *Area* 39(4), 490-498.

Malanson GP, Scuderi L, Moser K, et al. (2014) The composite nature of physical geography. *Progress in Physical Geography* 38(1): 3–18.

Viles, Heather (2004) A Divided Discipline? In *Questioning Geography*.

Relevance

Church, Michael (2010) 'Relevance: The Application of Physical Geographical Knowledge,' In Gomez and Jones (eds) *Key Concepts in Geography.*

Ramasubramanian, Laxmi (2016) 'Using Geo-Spatial Knowledge for Good Governance,' in H Onsrud and W Kuhn (eds) *Advancing Geographic Information Science: The Past and Next Twenty Years*, Needham: GSDI Association Press, 307-311.

Science

Brown, James D. (2004). Knowledge, uncertainty and physical geography: Towards the development of methodologies for questioning belief. *Transactions of the Institute of British Geographers*, 29(3), 367-381.

Conner, Clifford (2005) 'What Science? What History? What People?,' in *A People's History of Science: Miners, Midwives, and "Low Mechanicks,"* New York: Nation Books, 1-25.

Harrison, Stephan (2004) What Kind of Science Is Physical Geography? In *Questioning Geography*
Kent, M., (2009) Space: making room for space in physical geography. In: N. J. Clifford, S. Holloway, S. Rice and G. Valentine, eds. *Key Concepts in Geography*, Second ed. London: SAGE, pp.97–118
Raj, Kapil (2007) 'Chapter 2: Circulation and the Emergence of Modern Mapping: Great Britain and Early Colonial India, 1764-1820,' in *Relocating Modern Science*, New York: Palgrave MacMillan, 60-94.
Richards, Keith (2009) Geography and the physical sciences tradition, in Clifford et al., eds, *Key Concepts in Geography*, 21-45.

Urban Environments

Ashmore, Peter, and Belinda Dodson. (2017) Urbanizing physical geography. The Canadian Geographer 61 (1): 102–106.
McClintock, N. (2015). A Critical Physical Geography of urban soil contamination. *Geoforum* 65: 69–85.