

## Syllabus for GIS 300: GIS Applications 1, Fall 2020

**Instructor: Dr. Tora Johnson, GIS Director, Office: Science 107A**

NOTE: Due to the pandemic, I will rarely be in my office. The best way to reach me is email, cell call or text, or chat via Google or Facebook.

**Phone: (207) 255-1214 (office) / (207) 266-2268 (cell) ~ Email: [tjohnson@maine.edu](mailto:tjohnson@maine.edu)  
Office Hours (SUBJECT TO CHANGE): Tuesdays & Fridays 12 - 2pm & Wednesdays 3:30 - 5pm  
or by appointment**

YOU MAY RESERVE TIMES TO MEET WITH TORA DURING OFFICE HOURS BY PHONE OR ZOOM AT <http://bit.ly/toraofficehours>. If you are meeting via Zoom, check your email at your meeting time or simply log onto <https://maine.zoom.us/j/2072551214>. You may use audio via your computer microphone and speakers or via telephone: US: +1 646 876 9923 or +1 669 900 6833 or +1 408 638 0968 (in Canada: +1 647 558 0588). Meeting ID: 207 255 1214

**Graduate Teaching Assistant: Amy Dowley: Torrey 223A, UMM**

**Email: [amy.dowley@maine.edu](mailto:amy.dowley@maine.edu) or Google Chat**

**Office Hours in UMM GIS Lab: Mondays 10am - 12pm & 1 - 2pm or by appointment**

### **1. Class Meetings:**

#### Blended Sections:

Lectures: Mondays & Fridays from 8:30am-9:50pm via Zoom

Labs: Tuesdays 8:30am-10:30am

#### Online Sections:

Lectures: You may "attend" the live classes via the Internet or watch the recorded lectures at your convenience click the link on the course homepage to join the Zoom session.

Labs: Complete exercises on your own.

Online Sections are also **REQUIRED** to attend three synchronous sessions. See our course website for details and to sign up for times. **SPACE IS LIMITED FOR SYNCHRONOUS SESSIONS, SO YOU MUST SIGN UP!**

IMPORTANT: All GIS 1 students are required to use the course website on Brightspace for assignments, quizzes, discussion forums, grades and streaming lectures. No work will be accepted via email.

**1. Prerequisites:** ANT 521/ GIS 300 Geographic Information Systems I or equivalent, experience with spreadsheets, high school algebra, and general knowledge of descriptive statistics. Students will be expected to spend a significant amount of time in the lab to complete lab activities and manage independent projects.

Students must either...

- Have a computer (Windows only) that meets the minimum system requirements for ArcGIS software ([see details here](#)). We will provide software for free.

OR

- Have a computer (Windows or Mac--no tablets or Chromebooks) and broadband internet access to remotely access a computer in the UMM GIS lab or Nutting 254 on the Orono campus. We will provide information about how to access the computers remotely in class.

Students must have or have access to a broadband internet connection for watching lectures and downloading and uploading data for assignments. A webcam and microphone is recommended but not required.

**2. Course Description:** This is an intermediate/advanced course for students who have had some introduction to GIS and wish to pursue applications in the natural sciences. We will focus on grid-based data models for visualization, modeling, and analysis. Assessment will be based on problem sets, lab work, and a final project. Readings, assignments, activities, and discussions will cover: The raster data model, generating and working with grid data, georeferencing images and grids, remote sensing technologies and data, visualizing and managing raster datasets, interpolation methods for generating continuous surface data, mathematical operations with grid data for spatial analysis, map algebra and grid-based modeling, modeling to assess or predict habitat, development, and risk, basic change analysis with satellite imagery, evaluating and documenting error and uncertainty, ethics and accountability in spatial analysis, modeling and visualization. 4 credits.

### 3. Learning Outcomes

1. Intermediate to advanced ability to read maps, constructively critique their cartographic design, and evaluate how they communicate information
2. Ability to symbolize raster data sets for effective communication
3. Working knowledge of the raster data model and types of raster data sets
4. Ability to design, execute, evaluate, and document raster and vector analysis models, including map algebra, for natural resource applications
5. Ability to conduct basic spatial statistical analysis
6. Ability to translate a problem in science or policy into raster data and analytical models, and use ArcGIS Spatial Analyst software and methods to produce maps and/or information addressing those needs
7. Intermediate understanding of projections, coordinate systems and georeferencing
8. Familiarity with the breadth and depth of applications of raster data models and analysis in natural resource applications
9. Familiarity with principles and concepts of cartography, information science, geography, and design as they relate to raster analysis

**4. Methodology:** This course relies heavily upon learning advanced ArcGIS software and applying it to a geographic problem. To this end, the course includes lab sessions, lectures, activities, assignments, and discussions intended to provide students with the knowledge, skills, and perspectives they need to understand and use raster data models and tools for spatial analysis.

**5. Activities and Assignments:** Late assignments, without PRIOR arrangement with the instructor, will receive a reduced grade. **See schedule of topics assignments, readings and labs [HERE](#).**

**i) Lab Assignments:** There will be weekly online lab exercises via the Esri Online Training website, and students will complete the module test at the end of modules.

**ii) Quizzes:** There will be occasional short quizzes on the course website to be taken on material from the lectures, labs and readings.

**iii) Problem Sets:** In addition, there will be two or three assignments that allow students to practice and apply the concepts and skills presented in class. The problem sets will commonly include both mapmaking exercises and written responses. Assignments must be submitted as required (your instructor will specify which you are to use) to receive full credit.

**iv) Map Critique:** Once during the semester, each student will find a map or set of maps that interest them and lead a class critique of that map.

**v) Literature Review:** Integrated review of literature relevant to final project work.

**vi) Final Project:** Each student will be responsible for completing a final project applying

the course concepts and skills to a problem of interest. In addition to maps, the project will include thorough documentation of the process, relevant background, and theoretical frameworks.

**vii) Final Project Presentation:** Each student will give a formal 10 to 15 minute presentation of their final project at the end of the semester. If the class does one or more group service projects for clients, the presentations will likely be given to the clients as well as classmates. **GIS 522: Project assignment includes literature review component.**

## **6. Attendance and Class Participation Policy:**

Lectures are available in real time or streamed at the student's convenience. A link to live lectures is on the homepage of the course website. Recorded lectures will be available on the course website on the module page for that week. Recordings are typically posted by the following morning.

You will receive an attendance code for each lecture to submit on Brightspace to receive attendance credit. We work on an honor system: By entering the code, you are indicating that you have watched the entire lecture and have done the demonstrated exercises. If skipping the videos becomes a problem, we will need to switch to a more onerous method for tracking attendance. So, please don't enter a code for a lecture you have not viewed.

You should plan to log into the course website at least three to four times per week

Participation: In addition to participation in the lectures, labs and/or synchronous sessions, students are expected to contribute to class discussions on Brightspace for some problem sets over the course of the semester.

## **7. Evaluation:** Grades will be calculated as follows:

- a) Attendance & Participation (10%)
- b) Problem Sets (20%): Students will earn full credit for assignments that include required written, electronic and printed components in which the assigned questions and activities are addressed completely and directly.
- c) Lab Assignments (20%) Students must present confirmation of modules completed to receive credit for lab activities.
- d) Quizzes (10%)
- e) Map Critique (5%): Students must show an understanding of the relevant criteria and processes for map critique discussed in class and lead a discussion about a map of their choosing.
- f) Literature Review (10%): Integrated review of literature relevant to final project work.
- g) Final Project (30%): This is a major part of the course and must receive a significant amount of each student's attention. Final project topics must be approved in advance by the instructor. Most GIS II classes take on one or more group projects for clients, in which case students will be required to contribute to a larger effort. Projects on unapproved topics will not be accepted. The grade for this project will be assessed based on data modeling and management, cartographic and graphic quality of maps or digital map products, thoroughness of documentation, effort and conscientiousness, and applicability to the problem being addressed.
- h) Final Project Presentation (5%): Each student must create a presentation that effectively presents the results of their GIS final project. Presentations awarded full points will be professional (well-rehearsed, high-quality products) and will clearly demonstrate the student's seriousness and perseverance.

## 8. Grading System

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<b>A</b>	90-92	93-97	98-100
<b>B</b>	80-82	83-87	88-89
<b>C</b>	70-72	73-77	78-79
<b>D</b>	60-62	63-67	68-69
<b>F</b>		<60	

**9. Required Materials:** In addition to the online modules, readings will be assigned from the required texts:

- No required textbook. Additional readings will come from the following (among others):
- Online text- free: ArcGIS Desktop Help and Documentation
- Esri Online Training Modules, as assigned: <http://training.esri.com/gateway/index.cfm>
- Others, as assigned.

**10. Accommodations and Special Circumstances:** If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me, Tora Johnson, privately as soon as possible.

If you have ANY other circumstance that makes it difficult for you to feel comfortable in class, complete your coursework, or access education, please feel free to let me know. Even if you are taking the class from a distance, there is a lot I can do to help.

**11. Academic dishonesty** policies will be strictly enforced. Academic dishonesty is bad for everybody—it's disrespectful to the cheater's fellow students and instructor, and most important, it does a disservice to the cheater. You are expected to abide by the expectations and responsibilities of academic trust as outlined in the University of Maine System's Academic Integrity Policy found at the following address: <https://www.maine.edu/board-of-trustees/policy-manual/section-314/>.

Assignments that are flawed by academic dishonesty will receive a zero. Two incidences of academic dishonesty will result in a failing grade for the course. **All instances of academic dishonesty will be reported to the Vice President for Academic Affairs and the Student Conduct Office.** A special consideration when using GIS data: Students must cite the source of all spatial and attribute data provided by or derived from outside sources and must abide by data usage guidelines of the data product provider.

**12. A Safe and Respectful Space to Learn:** NO DIScounts! In this class, you must treat your classmates, your teacher, lab staff, and yourself with respect. Let's work together to make the lab and our online space a safe, pleasant, and functional place to work and learn for everyone. Be considerate, quiet, neat, helpful, and supportive. If someone is doing something inappropriate in class, please tell me immediately.

IN CLASS, DO NOT text, peruse or post on social media, play video games, surf the web for things unrelated to class, etc.

DO NOT post or say hostile, derisive or otherwise inappropriate comments.

**If I catch you doing these rude things, I will call you out immediately, and you will feel very bad.** Persistent disruptive behavior in class or online will be grounds for removal from the class, which will make you feel even worse. You will get an F in the class and will not receive a refund on your tuition.

**14. COVID-19** is an infectious disease caused by the coronavirus SARS-CoV-2. The virus is transmitted person-to-person through respiratory droplets that are expelled when breathing, talking, eating, coughing or sneezing. Additionally, the virus is stable on surfaces and can be transmitted when someone touches a contaminated surface and transfers the virus to their nose or mouth. When someone becomes infected with COVID-19 they may either have no symptoms or symptoms that range from mild to severe and can even be fatal. During this global pandemic, it is imperative that all students, faculty, and staff abide by the safety protocols and guidelines set forth by the university to ensure the safety of our campus. All students are encouraged to make the [Clippers Care Pact](#)/ [Black Bear Care Pact](#) to protect the health of themselves, the health of others, and the college of our hearts always.

For the health and safety of our community, only students in the blended section will have access to the GIS lab in Torrey 223 to do their GIS classwork. Please see the lab guidelines below. Students will not be allowed to physically enter the lab in Nutting 254. Instead, online students will be able to access lab computers in Torrey at UMM or Nutting at UM to do their classwork remotely.

**Course Schedule Disclaimer (Disruption Clause):** In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

**15. Observance of Religious Holidays/Events:** The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

**16. Sexual Discrimination Reporting:** The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, your teacher is required to report this information to Title IX Student Services or the Office of Equal Opportunity.

Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

**Why do teachers have to report sexual discrimination?** The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns

that might arise – for example, if more than one victim reports having been assaulted or harassed by the same individual.

**What will happen to a student if a teacher reports?** An employee from Title IX Student Services or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources:

For *confidential resources on campus*: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.

For *confidential resources off campus*: Rape Response Services: 1-800-871-7741 or Partners for Peace: 1-800-863-9909.

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

**For support services on campus:** Title IX Student Services: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the OSVP website for a complete list of services at <http://www.umaine.edu/osavp/>

**15. Tech Support** is available at [Support Home » Support](#)

- Phone support: Monday - Friday, 8 AM - 4:30 PM 1-800-696-4357 or Email: [help@maine.edu](mailto:help@maine.edu)
- [Live Chat Support](#) is available Monday-Friday, 8 AM - 8 PM and Saturdays & Sundays, 10 AM - 6 PM
- Brightspace Navigation and Tutorial Links for Students:
  - [Brightspace Student Video Tutorials](#)

**16. Library Information:** [Merrill Library](#) is here to serve you! Come in to study, read, and research. You can reach us via [Chat](#), [Zoom](#), [Email](#), and phone (255-1234). Take a look at our [Library Orientation](#) page and our [FAQs](#) for a quick start. For more "How To" take a look at our [Research Guides](#).

**Some Advice:**

- You should plan on spending at least 5 to 10 hours per week doing GIS work. So please inspect your personal weekly schedule to be sure that you budget sufficient time. You will have several problem sets due in quick succession over the course of the semester. Be careful of falling behind in the class. Late assignments will get low grades, and you can leave yourself in a real jam with your project if you fall behind. If you start slipping behind, talk to your instructor as soon as you can so we can work on getting you caught up.
- We will be using software that is the industry standard for GIS. Though it is very powerful and versatile (that's why so many people use it), it is notoriously temperamental. Save often and don't get too attached to doing things in one particular way—often you will need to work around difficult problems. Breathe, be patient, and ask for help. Don't try to memorize all the buttons and steps; it's impossible. Instead use a heuristic, "trial and error" approach to solving problems.
- Communicate with your instructor, TAs, and classmates about problems you encounter or questions you have. You will save yourself lots of time and frustration if you draw on as many resources as you can to solve GIS problems (that's how we do it in the "real world"). It's not cheating as long as all your assignments are written in your own words and reflect your own work.
- Feel free to call me on my cell (voice or text) or send a message on Facebook or Google Chat. However, please don't call or text before 8am or after 9pm unless it's an actual emergency. I actually WANT you to call with problems, rather than spending hours in frustration. Ultimately, it will save us all time and help you learn and progress.
- Plan to spend several hours per week outside of class time to complete your assignments. It's a good idea to block out time in your schedule to spend in the lab or at your computer. That way you will be sure to devote the time and won't schedule over it. Also, expect to spend more time toward the end of the semester.
- "But I only need to make one map for my project," you say. "I can probably pull a couple of all-nighters during finals week to get it done." Don't count on it. Your project will involve generating new map layers, and the technology is not always cooperative—especially during finals week.
- DO make yourself comfortable in the lab whenever you are there. Feel free to adjust the positions of chairs, monitors, mice, and keyboards.
- DO NOT plagiarize in your written assignments. Answers for all assignments should represent your original work and your own words. That means you should NEVER, EVER copy material in print or online or from any other source without setting it apart in quotes or by indentation and using proper and complete attribution. A quote will NEVER, EVER constitute a complete answer to an assigned question and may only be used as supporting information to your original answers.
- DO NOT plagiarize maps or GIS data. Assigned maps should be designed by you and must not be made from existing templates or symbologies, except where the assignment calls for a template (group projects will often involve templates, for example). Maps made from unassigned templates will not be accepted. Typically, yellow "layer" files with the .lyr extension and map template files with the .mxt extension are not to be used to make a new map, unless your assignment specifically calls for them.



**GIS 400-ANT 522 Geographic Information Systems (GIS) Applications 1 Fall 2020**

**Dates are subject to change. Visit the course website for current info.**

Wk	Date	Subject	Reading/ Media	Assignments	Lab
1	Aug 31	Raster Data Model, Intro to Spatial Analyst; Raster Data types	Coursera: GIS Data Formats: ( <a href="https://www.coursera.org/learn/gis-data/lecture/22VKB/module-1-overview">https://www.coursera.org/learn/gis-data/lecture/22VKB/module-1-overview</a> ) Watch all the videos AND	<b>Student Information Survey</b>	<a href="https://www.esri.com/training/catalog/5dd4485b6cd66f196fbddad/introduction-to-spatial-data/">Introduction to Spatial Data</a> ( <a href="https://www.esri.com/training/catalog/5dd4485b6cd66f196fbddad/introduction-to-spatial-data/">https://www.esri.com/training/catalog/5dd4485b6cd66f196fbddad/introduction-to-spatial-data/</a> )
		Map Critique (Tora); Advanced design & composition; Zones, Neighborhoods & Null Values; Raster vs. Vector Data Models; Downloading & Extracting DEM Data	ArcGIS Help: Raster Data, read all parts of the Introduction and Fundamentals sections, skim Supported section ( <a href="http://desktop.arcgis.com/en/arcmap/latest/manage-data/raster-and-images/what-is-raster-data.htm">http://desktop.arcgis.com/en/arcmap/latest/manage-data/raster-and-images/what-is-raster-data.htm</a> ) AND ArcGIS Help: Spatial Analyst, read What is, Essential Terms, and Sample Applications ( <a href="http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/what-is-the-spatial-analyst-extension.htm">http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/what-is-the-spatial-analyst-extension.htm</a> )		AND Getting Started with Spatial Analysis ( <a href="https://www.esri.com/training/catalog/5bca58f8f77b99238f845e1c/getting-started-with-spatial-analysis/">https://www.esri.com/training/catalog/5bca58f8f77b99238f845e1c/getting-started-with-spatial-analysis/</a> ) AND <a href="https://www.esri.com/training/catalog/57630433851d31e02a43eebc/building-geoprocessing-models-using-arcgis-pro/">Building Geoprocessing Models Using ArcGIS Pro</a> ( <a href="https://www.esri.com/training/catalog/57630433851d31e02a43eebc/building-geoprocessing-models-using-arcgis-pro/">https://www.esri.com/training/catalog/57630433851d31e02a43eebc/building-geoprocessing-models-using-arcgis-pro/</a> )
2	Sept 7 <b>NO MONDAY CLASS LABOR DAY</b>	Operations, Procedures & Controls; Types of Analysis: Local, Neighborhood / Focal, Zonal, Global; Starting with Local & Neighborhood Functions for Terrain	ArcGIS Help: Performing Analysis, read all sections ( <a href="http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/performing-analysis/about-performing-analysis-with-spatial-analyst.htm">http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/performing-analysis/about-performing-analysis-with-spatial-analyst.htm</a> ) Some may be overly technical, so just skim. AND ArcGIS Help: Surface Analysis, read all sections ( <a href="http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/performing-analysis/about-performing-analysis-with-spatial-analyst.htm">http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/performing-analysis/about-performing-analysis-with-spatial-analyst.htm</a> )	<b>Map Critique Assigned</b>	<a href="https://www.esri.com/training/catalog/5c08179b7351db0c2ab3fbf4/introduction-to-suitability-modeling/">Introduction to Suitability Modeling</a> ( <a href="https://www.esri.com/training/catalog/5c08179b7351db0c2ab3fbf4/introduction-to-suitability-modeling/">https://www.esri.com/training/catalog/5c08179b7351db0c2ab3fbf4/introduction-to-suitability-modeling/</a> )  AND <a href="https://www.esri.com/training/catalog/5cbf7e336b7be96">Creating a Weighted Suitability Model</a> ( <a href="https://www.esri.com/training/catalog/5cbf7e336b7be96">https://www.esri.com/training/catalog/5cbf7e336b7be96</a> )

		Analysis (slope, aspect, hillshade)	<a href="http://desktop.arcgis.com/en/arcmap/latest/analyze/commonly-used-tools/surface-creation-and-analysis.htm">n/arcmap/latest/analyze/commonly-used-tools/surface-creation-and-analysis.htm</a> AND Map design readings (see course website)		<a href="https://www.esri.com/training/catalog/209849309/creating-a-weighted-suitability-model/">209849309/creating-a-weighted-suitability-model/</a>
<b>3</b>	<b>Sept 14</b>	Map Algebra; Descriptive Models; Final Project Assignment	ArcGIS Help: Map Algebra ( <a href="http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/map-algebra/what-is-map-algebra.htm">http://desktop.arcgis.com/en/arcmap/latest/extensions/spatial-analyst/map-algebra/what-is-map-algebra.htm</a> ) read all sections, skim the parts that are TMI.		<a href="https://www.esri.com/training/catalog/5bcf6a3218e35b787fb17c86/displaying-raster-data-in-arcgis/">Displaying Raster Data Using ArcGIS Pro</a> ( <a href="https://www.esri.com/training/catalog/5bcf6a3218e35b787fb17c86/displaying-raster-data-in-arcgis/">https://www.esri.com/training/catalog/5bcf6a3218e35b787fb17c86/displaying-raster-data-in-arcgis/</a> )
		Prescriptive Modeling Problems & Practice	ArcGIS Help: Geoprocessing ( <a href="http://desktop.arcgis.com/en/arcmap/latest/analyze/main/what-is-geoprocessing.htm">http://desktop.arcgis.com/en/arcmap/latest/analyze/main/what-is-geoprocessing.htm</a> ) read all Introduction sections.		
<b>4</b>	<b>Sept 21</b>	Muskrat Model	Understanding the Suitability Modeling Workflow ( <a href="https://www.esri.com/training/catalog/5a26e387e79aee27e88b70a5/understanding-the-suitability-modeling-workflow/">https://www.esri.com/training/catalog/5a26e387e79aee27e88b70a5/understanding-the-suitability-modeling-workflow/</a> )	<b>Final Project Assigned &amp; ANT 522 Literature Review Assigned</b>	<a href="https://www.esri.com/training/catalog/57630433851d31e02a43eee1/distance-analysis-using-arcgis-pro/">Distance Analysis Using ArcGIS Pro</a> ( <a href="https://www.esri.com/training/catalog/57630433851d31e02a43eee1/distance-analysis-using-arcgis-pro/">https://www.esri.com/training/catalog/57630433851d31e02a43eee1/distance-analysis-using-arcgis-pro/</a> )
		Finish Muskrat Model			
<b>5</b>	<b>Sept 28</b>	Viewsheds; Reclassification (zonal) & Modeling; Map Critique (Student)	ArcGIS Help: Review Viewsheds ( <a href="http://desktop.arcgis.com/en/arcmap/latest/analyze/commonly-used-tools/surface-creation-and-analysis.htm">http://desktop.arcgis.com/en/arcmap/latest/analyze/commonly-used-tools/surface-creation-and-analysis.htm</a> ) AND Understanding Reclassification ( <a href="http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-analyst-toolbox/understanding-reclassification.htm">http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-analyst-toolbox/understanding-reclassification.htm</a> )	<b>Problem Set 1 Assigned</b>	Terrain Analysis Using ArcGIS Pro ( <a href="https://www.esri.com/training/catalog/57630436851d31e02a43f18f/terrain-analysis-using-arcgis-pro/">https://www.esri.com/training/catalog/57630436851d31e02a43f18f/terrain-analysis-using-arcgis-pro/</a> )

		Hydrological Data & Modeling; Euclidean Distance (local)	ArcGIS Help: Understanding Drainage Systems ( <a href="http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-analyst-toolbox/understanding-drainage-systems.htm">http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-analyst-toolbox/understanding-drainage-systems.htm</a> ), read all sections. AND Berry, Beyond Mapping III, Topic 20: Surface Flow Modeling ( <a href="http://www.innovativegis.com/basis/mapanalysis/Topic20/Topic20.htm">http://www.innovativegis.com/basis/mapanalysis/Topic20/Topic20.htm</a> )		
<b>6</b>	<b>Oct 5</b>	Advanced Projections & Transformations AND Wrap up PS 1; Project Assignment; Map Critique (Student)	Esri Tutorial: Basics of Map Projections (the first part will be review; just read the material. <a href="https://www.esri.com/training/catalog/5763042b851d31e02a43ed61/basics-of-map-projections/">https://www.esri.com/training/catalog/5763042b851d31e02a43ed61/basics-of-map-projections/</a> )		<u>Mapping Clusters: Intro to Statistical Cluster Analysis</u> ( <a href="https://www.esri.com/training/catalog/5d39b6106b9c17664bb656eb/mapping-clusters%3A-introduction-to-statistical-cluster-analysis/">https://www.esri.com/training/catalog/5d39b6106b9c17664bb656eb/mapping-clusters%3A-introduction-to-statistical-cluster-analysis/</a> )  AND
		Overview of Spatial Concepts, Spatial Statistics	ArcGIS Help: Modeling Spatial Relationships ( <a href="http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-statistics-toolbox/modeling-spatial-relationships.htm">http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-statistics-toolbox/modeling-spatial-relationships.htm</a> ) Read through Delaunay triangulation, then skim.	<b>Problem Set 1 Due</b>	<u>Mapping Clusters: Optimized Hot Spot and Optimized Outlier Analysis</u> ( <a href="https://www.esri.com/training/catalog/5d39b6d66b9c17664bb65992/mapping-clusters%3A-optimized-hot-spot-and-optimized-outlier-analysis/">https://www.esri.com/training/catalog/5d39b6d66b9c17664bb65992/mapping-clusters%3A-optimized-hot-spot-and-optimized-outlier-analysis/</a> )
<b>7</b>	<b>Oct 12 NO MONDAY CLASS INDIGENOUS PEOPLE'S DAY</b>	Change and Distribution, incl. Mean Centers, Mean Direction, etc.	Population Drift by Joseph Kerski, Esri ( <a href="https://www.esri.com/news/arcuser/0311/files/popdrift.pdf">https://www.esri.com/news/arcuser/0311/files/popdrift.pdf</a> )		<u>Calculating Density Using ArcGIS</u> ( <a href="https://www.esri.com/training/catalog/59a5a7f3b66ef82f7a87b2b9/calculating-density-using-arcgis/">https://www.esri.com/training/catalog/59a5a7f3b66ef82f7a87b2b9/calculating-density-using-arcgis/</a> )

8	Oct 19	Clustering and Hot-spots; PS & Project Work; Map Critique (Student)	Bambrick: What is Hotspot Analysis? ( <a href="https://glenbambrick.com/2016/01/21/what-is-hotspot-analysis/">https://glenbambrick.com/2016/01/21/what-is-hotspot-analysis/</a> ) AND Bambrick: [An Introduction to] Hotspot Analysis Using ArcGIS ( <a href="https://glenbambrick.com/2016/01/21/hotspot-analysis-using-arcgis/">https://glenbambrick.com/2016/01/21/hotspot-analysis-using-arcgis/</a> ) We'll do this activity in class.	Problem Set 2 Assigned	<a href="https://www.esri.com/training/catalog/57630430851d31e02a43ee0c/introduction-to-regression-analysis-using-arcgis-pro/">Introduction to Regression Analysis Using ArcGIS Pro</a> ( <a href="https://www.esri.com/training/catalog/57630430851d31e02a43ee0c/introduction-to-regression-analysis-using-arcgis-pro/">https://www.esri.com/training/catalog/57630430851d31e02a43ee0c/introduction-to-regression-analysis-using-arcgis-pro/</a> )
		Spatial Collocation & regression	ArcGIS Help: Regression ( <a href="http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-statistics-toolbox/regression-analysis-basics.htm">http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-statistics-toolbox/regression-analysis-basics.htm</a> ), Read Basics, Interpreting OLS results, and What they don't tell you...		
9	Oct 26	Intro to Interpolation and Spatial Autocorrelation	ArcGIS Help: Understanding Interpolation Analysis: Read all sections ( <a href="http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-analyst-toolbox/understanding-interpolation-analysis.htm">http://desktop.arcgis.com/en/arcmap/latest/tools/spatial-analyst-toolbox/understanding-interpolation-analysis.htm</a> )	Problem Set 2 Due	<a href="https://www.esri.com/training/catalog/5c92b940fa73df28264fb8ed/spatial-interpolation-with-arcgis-pro/">Spatial Interpolation with ArcGIS Pro</a> ( <a href="https://www.esri.com/training/catalog/5c92b940fa73df28264fb8ed/spatial-interpolation-with-arcgis-pro/">https://www.esri.com/training/catalog/5c92b940fa73df28264fb8ed/spatial-interpolation-with-arcgis-pro/</a> )
		Kriging & Spline; Map Critique (Student)		Problem Set 3 Assigned	
10	Nov 2	Residual Analysis	Geospatial Analysis - A comprehensive guide - Updated May 2020: Read the following sections... <a href="#">6.5 Gridding, Interpolation and Contouring- whole section</a> <a href="#">6.6 Deterministic Interpolation Methods- IDW section</a> <a href="#">SKIM: 6.7 Geostatistical Interpolation Methods</a>	ANT 522: Literature Review Due	<a href="https://www.esri.com/training/catalog/5d8a8c9055cf937306dba777/geostatistical-interpolation%3A-introduction/">Geostatistical Interpolation: Introduction</a> ( <a href="https://www.esri.com/training/catalog/5d8a8c9055cf937306dba777/geostatistical-interpolation%3A-introduction/">https://www.esri.com/training/catalog/5d8a8c9055cf937306dba777/geostatistical-interpolation%3A-introduction/</a> )
		Finish Residual Analysis			

<b>11</b>	<b>Nov 9 NO WEDNE SDAY CLASS VETERA NS' DAY</b>	Wrapping up PS3		<b>Problem Set 3 Due</b>	<b>Select A Tutorial</b>
<b>12</b>	<b>Nov 16</b>	Project Work			
		Project Work			
<b>13</b>	<b>Nov 23 THANKS GIVING BREAK BEGINS NOV 25</b>	Project Work			
<b>14</b>	<b>Nov 30</b>	Project Work			
<b>15</b>	<b>Dec 7</b>	Final Project Presentations		<b>Presentati ons</b>	
<b>Final s</b>	<b>Dec 14</b>	<b>FINALS WEEK Complete Final Project due by midnight Thursday, Dec 17th</b>			