

Request for Graduate Course Addition

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one identical PDF copy to the Graduate Council Chair. If attachments included, please merge into a single file.
3. **The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.**

College: COLA Dept/Division: Geography Alpha Designator/Number: GEO 523 Graded CR/NC

Contact Person: Hilton A. Cordoba Phone: (786) 263-1415

NEW COURSE DATA:

New Course Title: Cartography & GIS

Alpha Designator/Number:

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Title Abbreviation:

C	a	r	t	o	g	r	a	p	h	y		&		G	I	S											
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(Limit of 25 characters and spaces)

Course Catalog Description:

An introduction to cartography as the cornerstone of geographic information systems/science. Students will learn GIS-based map making, interpretation, and design. The course explores cartographic techniques to represent and visualize data.

(Limit of 30 words)

Co-requisite(s): None First Term to be Offered: Fall 2018

Prerequisite(s): None Credit Hours: 3

Course(s) being deleted in place of this addition (*must submit course deletion form*): _____

Signatures: if disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head _____	Date _____
Registrar _____	Date _____
College Curriculum Chair _____	Date _____
Graduate Council Chair _____	Date _____

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College: COLA

Department/Division: Geography

Alpha Designator/Number: GEO 523

Provide complete information regarding the new course addition for each topic listed below. Before routing this form, a complete syllabus also must be attached addressing the items listed on the first page of this form.

1. FACULTY: Identify by name the faculty in your department/division who may teach this course.

Jonathan Kozar, James Leonard, Anita Walz, Kevin Law, Hilton Cordoba.

2. DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the proposal. Enter "**Not Applicable**" if not applicable.

Not applicable

3. REQUIRED COURSE: If this course will be required by another department(s), identify it/them by name. Enter "**Not Applicable**" if not applicable.

Not applicable

4. AGREEMENTS: If there are any agreements required to provide clinical experiences, attach the details and the signed agreement. Enter "**Not Applicable**" if not applicable.

Not applicable

5. ADDITIONAL RESOURCE REQUIREMENTS: If your department requires additional faculty, equipment, or specialized materials to teach this course, attach an estimate of the time and money required to secure these items. (Note: Approval of this form does not imply approval for additional resources.) Enter "**Not Applicable**" if not applicable.

Not applicable

6. COURSE OBJECTIVES: (May be submitted as a separate document)

- Students will learn to select appropriate map projections and coordinate systems for cartographic productions at various scales
- Students will know how data is represented in a GIS.
- Students will employ cartographic theory to select visual representations and symbols that fit the logic of the data being mapped.
- Students will learn to apply the principles of cartographic generalization
- Students will design a layout using visual hierarchy, balance, and figure-ground of text and graphics to quickly communicate the subject and purpose of the map.
- Students will learn to create maps using ArcMap.

7. COURSE OUTLINE (May be submitted as a separate document)

See separate document.

8. SAMPLE TEXT(S) WITH AUTHOR(S) AND PUBLICATION DATES (May be submitted as a separate document)

1) Map Use: Reading, Analysis, Interpretation. 8th Edition. A. Jon Kimerling, Aileen R. Buckley, Phillip C. Muehrcke, Juliana O. Muehrcke. Esri Press. ISBN: 978-1589484429.

2) Getting to Know ArcGIS. (4th edition). Michael Law & Amy Collins. Esri Press. ISBN: 9781589483828

9. EXAMPLE OF INSTRUCTIONAL METHODS (Lecture, lab, internship)

See separate document.

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10. EXAMPLE EVALUATION METHODS (CHAPTER, MIDTERM, FINAL, PROJECTS, ETC.)

See separate document

11. ADDITIONAL GRADUATE REQUIREMENTS IF LISTED AS AN UNDERGRADUATE/GRADUATE COURSE

- Student must submit five map critiques throughout the semester of cartographic products found on the web, magazines, and other mediums.
- Final cartographic product must be poster size and printed to be displayed for public viewing.
- Final cartographic product must include a minimum of two peer reviews and a personal reflection.

12. PROVIDE COMPLETE BIBLIOGRAPHY (May be submitted as a separate document)

- Bertin, J. (2011). *Semiology of graphics: diagrams, networks, maps*. Redlands, CA: ESRI Press.
- Brewer, C. A. (2016). *Designing better maps: a guide for GIS users*. Redlands, CA: Esri Press.
- Defense Mapping Agency (2006). *Datums, ellipsoids, grids, and grid reference systems*. DMA technical manual 8358.1. Washington D.C. <http://earth-info.nga.mil/GandG/publications/tm8358.1/toc.html>.
- Illife, J.C. (2000). *Datums and map projections for remote sensing, GIS, and surveying*. Caithness, Scotland: Whittles Publishing.
- Jones, Alexander. (2012). Ptolemy ' s Geography: Mapmaking and the Scientific Enterprise. In *Ancient Perspectives: Maps and Their Place in Mesopotamia, Egypt, Greece and Rome*, edited by Richard J.A. Talbert, 109 – 128. Chicago: University of Chicago Press.
- Kimerling, A.J. (2012). *Map Use: Reading, Analysis, Interpretation*. Esri Press.
- Kitchin, R.M. (1994). Cognitive Maps: What they are and why study them? *Journal of Environmental Psychology* 14: 1-19.
- Mather, M.M. (2010). *Lining up data in GIS: A guide to map projections*. Redlands, CA: Esri Press.
- Monmonier, M. (1996). *How to lie with maps*. Chicago: University of Chicago Press.
- Monmonier, M. and G.A. Schnell. (1988). *Map appreciation*. Englewood Cliffs, N.J.: Prentice Hall.
- Quattrochi, D.A., and M.F. Goodchild. (1997). *Scale in remote sensing and GIS*. Boca Raton, FL: Lewis Publishers.
- Robinson, A.H. and B. Bartz-Petchenik. (1976). *The nature of maps: Essays toward understanding maps and mapping*. Chicago: University of Chicago Press.
- Robinson, A.H. (1995). Basic geodesy. In *Elements of Cartography*. 6th ed. New York: John Wiley & Sons, Inc.
- Slocum, T. A. (2014). *Thematic cartography and geovisualization*. Pearson.
- Snyder, J.P. (1993). *Flattening the earth: A thousand years of map projections*. Chicago: University of Chicago Press.
- Söderström, Ola. (2011). How Images Assemble the World. In *New Geographies 4: Scales of the Earth*, 113 – 120. Cambridge, MA: Harvard University Graduate School of Design.
- Wood, Denis; John Fels. (1992). *The Power of Maps*. New York City: Guilford Press.

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Please insert in the text box below your course summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:

Course Number and Title:

Catalog Description:

Prerequisites:

First Term Offered:

Credit Hours:

Department: Geography

Course Number and Title: GEO 523 Cartography & GIS

Catalog Description: This course is an introduction to cartography and is the cornerstone of Geographic Information Science. In this class you will learn basic map design, map interpretation and appreciation. We will explore the nature of spatial data, and learn what maps can and cannot represent. We will study maps as a data source for Geographic Information Systems, and as a graphic tool for scientific visualization.

Prerequisites: None

First Term Offered: Fall 2018

Credit Hours: 3

References

- Bertin, J. (2011). *Semiology of graphics: diagrams, networks, maps*. Redlands, CA: ESRI Press.
- Brewer, C. A. (2016). *Designing better maps: a guide for GIS users*. Redlands, CA: Esri Press.
- Defense Mapping Agency (2006). *Datums, ellipsoids, grids, and grid reference systems*. DMA technical manual 8358.1. Washington D.C. <http://earth-info.nga.mil/GandG/publications/tm8358.1/toc.html>.
- Illife, J.C. (2000). *Datums and map projections for remote sensing, GIS, and surveying*. Caithness, Scotland: Whittles Publishing.
- Jones, Alexander. (2012). *Ptolemy's Geography: Mapmaking and the Scientific Enterprise*. In *Ancient Perspectives: Maps and Their Place in Mesopotamia, Egypt, Greece and Rome*, edited by Richard J.A. Talbert, 109–128. Chicago: University of Chicago Press.
- Kimerling, A.J. (2012). *Map Use: Reading, Analysis, Interpretation*. Esri Press.
- Kitchin, R.M. (1994). *Cognitive Maps: What they are and why study them?* *Journal of Environmental Psychology* 14: 1-19.
- Mather, M.M. (2010). *Lining up data in GIS: A guide to map projections*. Redlands, CA: Esri Press.
- Monmonier, M. (1996). *How to lie with maps*. Chicago: University of Chicago Press.
- Monmonier, M. and G.A. Schnell. (1988). *Map appreciation*. Englewood Cliffs, N.J.: Prentice Hall.
- Quattrochi, D.A., and M.F. Goodchild. (1997). *Scale in remote sensing and GIS*. Boca Raton, FL: Lewis Publishers.
- Robinson, A.H. and B. Bartz-Petchenik. (1976). *The nature of maps: Essays toward understanding maps and mapping*. Chicago: University of Chicago Press.
- Robinson, A.H. (1995). *Basic geodesy*. In *Elements of Cartography*. 6th ed. New York: John Wiley & Sons, Inc.
- Slocum, T. A. (2014). *Thematic cartography and geovisualization*. Pearson.
- Snyder, J.P. (1993). *Flattening the earth: A thousand years of map projections*. Chicago: University of Chicago Press.
- Söderström, Ola. (2011). *How Images Assemble the World*. In *New Geographies 4: Scales of the Earth*, 113–120. Cambridge, MA: Harvard University Graduate School of Design.
- Wood, Denis; John Fels. (1992). *The Power of Maps*. New York City: Guilford Press.

**Geography Department
College of Liberal Arts
Marshall University**

Course Information

Course Title: Cartography & GIS
Course #: GEO 523
Sect #: 201
CRN: 3362
Credit Hours: 3
Pre-requisites: None
Co-requisites: None
Term: Fall 2018

Meeting Information

Campus: Huntington
Classroom: HH 236
Days: Tuesday
Time: 4:00PM to 6:20PM

Instructor Information

Instructor: Hilton A. Córdoba, Ph.D.
Office: HH 210
Office Hours: T: 11:30AM – 12:30PM & 2:30PM – 4:00PM
R: 11:30AM – 12:30PM & 2:30PM – 4:30PM
And by appointment
E-mail: cordoba@marshall.edu
Phone: (304) 696-4627

University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to www.marshall.edu/academic-affairs/policies/ . Academic Dishonesty/Excused Absence Policy for Undergraduates/Computing Services Acceptable Use/Inclement Weather/Dead Week/Students with Disabilities/Academic Forgiveness/Academic Probation and Suspension/Academic Rights and Responsibilities of Students/Affirmative Action/Sexual Harassment
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Course Policies

Attendance will be recorded and will be incorporated in your final grade. See weight details in the course evaluation criteria.

Late entries, make-ups, or retakes for assignments are not accepted. Make-ups for missed assignments are granted only under extreme circumstances, for which the student is required to document her/his reason.

Incomplete grades are granted only under extreme circumstances, for which the student is required to document his or her case. After documenting your case, I will only grant an incomplete grade if at the time you stopped attending class you had a passing score (i.e. 70% or better).

Academic Dishonesty will not be tolerated in this class. All assignments are to be completed individually, meaning you may not be assisted by another person regardless of whether that person is enrolled in the class or not. Plagiarism on written assignments, whether one phrase, sentence, paragraph, or the entire assignment, is a form of academic dishonesty and will not be tolerated. Students who plagiarize or receive any form of assistance while completing any assignments will receive a final course grade of F and referral to the Office of Academic Affairs, without exception. The Academic Dishonesty Report Form used to report any and all cases of plagiarism or other forms of academic dishonesty is posted on the course homepage. See the definitions and policies for academic honesty and dishonesty in the MU Undergraduate Catalog.

Disability Policy Marshall University is committed to making all programs, services, and activities fully accessible to students with disabilities. The purpose of the Office of Disability Services Program is to provide the educational and physical accessibility support necessary for students to achieve their academic goals and to promote as much independence as possible on the part of the students with disabilities. Services are available for all students with disabilities at the University, whether they are full or part time students. Students are required to provide documentation of the disability. The program staff will work with students to individualize the type and level of services provided. Marshall University requires that you request any academic accommodations you may want in the classroom and/or for course assignments, etc. The purpose of this page is to tell you how to make your requests. The following policies and procedures are intended as a guide for your convenience.

Course Description

This course is an introduction to cartography and is the cornerstone of Geographic Information Science. In this class you will learn basic map design, map interpretation and appreciation. We will explore the nature of spatial data, and learn what maps can and cannot represent. We will study maps as a data source for Geographic Information Systems, and as a graphic tool for scientific visualization.

Course Objectives:

Course student learning outcomes	How students will practice each outcome in this course	How student achievement of each outcome will be assessed in this course
Students will learn to select appropriate map projections and coordinate systems for cartographic productions at various scales	In class demonstrations and lab sessions. Lab activities will be performed using tangible maps and GIS software.	Lab exercises, quiz questions, and through final cartographic product.
Students will know how data is represented in a GIS.	In class demonstrations and lab sessions. Lab activities will be performed using tangible maps and GIS software.	Lab exercises, quiz questions, and through final cartographic product.
Students will employ cartographic theory to select visual representations and symbols that fit the logic of the data being mapped.	In class demonstrations and lab sessions. Lab activities will be performed using tangible maps and GIS software.	Lab exercises, quiz questions, and through final cartographic product.
Students will learn to apply the principles of cartographic generalization.	In class demonstrations and lab sessions. Lab activities will be performed using tangible maps and GIS software.	Lab exercises, quiz questions, and through final cartographic product.
Students will design a layout using visual hierarchy, balance, and figure-ground of text and graphics to quickly communicate the subject and purpose of the map.	In class demonstrations and lab sessions. Lab activities will be performed using tangible maps and GIS software.	Lab exercises, quiz questions, and through final cartographic product.
Students will learn to create maps using ArcMap.	In class demonstrations and lab sessions. Lab activities will be performed using tangible maps and GIS software.	Lab exercises, quiz questions, and through final cartographic product.

Materials:

Textbook (Suggested):

Map Use: Reading, Analysis, Interpretation. 8th Edition. A. Jon Kimerling, Aileen R. Buckley, Phillip C. Muehrcke, Juliana O. Muehrcke. Esri Press. ISBN: 978-1589484429.

Workbook (required):

Getting to Know ArcGIS. (4th edition). Michael Law & Amy Collins. Esri Press. ISBN: 9781589483828

Supplies (required):

- USGS 7.5 minutes Las Pulgas Canyon, CA topographic map
- A flash drive
- A ruler

Classroom Etiquette

- 1) In order to enhance and maintain a productive atmosphere for education, **personal communication devices such as cellular telephones are to be ***turned off*** in class sessions.**
- 2) Please arrive on time! If you happened to be late, please **enter the classroom quietly** and **minimize all noise** as you settle in your seat.
- 3) If you plan to leave class early, please **inform me** of your expected departure time, otherwise, you will be marked absent.
- 4) All in-class discussions will be conducted in a respectful manner.

Netiquette: When emailing me-

- 1) Show that you have manners and include a simple salutation (“hello” will suffice).
- 2) Provide your class information (i.e. I’m in your TR or MW at xx time).
- 3) When asking for something, please do so politely.
- 4) If I feel that your question can best be answered in person, I will ask you to come see me during office hours or to schedule a Skype meeting/phone call.
- 5) If the answer to your inquiry can be found in the syllabus, I will reply with “see syllabus”.
- 6) If you email me anytime from Monday through Friday, expect a reply within 24 hours. Expect a longer return on weekends and holidays.
- 7) You will be expected to log into Blackboard every week to keep-up with announcements, assessment materials, and grades.

Course Evaluation Method

Assignment	Quantity	Value (points)	Total (points)
Quizzes	12	25	300
Labs	12	25	300
Map Critiques	5	15	75
Cartographic Production Project	1	200	200
Grand Total			875

Quizzes

There will be 12 quizzes and they will cover lecture material, assigned readings, and labs.

Labs

There will be 12 labs, and you will have one week to complete each. Do not expect to complete all of your lab work during the scheduled lab time. You will need to dedicate time outside of class to completing your labs.

Map Critiques

You will submit five map critiques throughout the semester of cartographic products found on the web. Magazines, and other mediums.

Cartographic Production Project

You will create a multivariate thematic map on a topic of your choice. The goal is to:

- 1) Apply the concepts and techniques learned in the semester
- 2) Have your peers critique your work, and in turn, revise your final map. Interpretation, evaluation and criticism are of critical importance and contribute to the discourse, understanding and appreciation of map design.
- 3) Create your first official map using state of the art ArcGIS software.

Specific guidelines about the project can be found on Blackboard

Grading Scale

You will accumulate points throughout the semester and the final grade/point distribution will be as follows:

A	875-788	100% to 90%
B	787-700	89% to 80%
C	699-613	79% to 70%
D	612-525	69% to 60%
F	524-0	59% to 0%

Tentative Schedule of Topics

Date	Topic	In-Class Activity	Due	Reading
23-Aug	Course overview			Syllabus
30-Aug	Maps, Cartography, and GIS	Lab 1		
6-Sep	Earth & Datums	Lab 2	Lab 1 Quiz 1 Map Critique 1	Ch. 1
13-Sep	Geographic Coordinates	Lab 3	Lab 2 Quiz 2	Ch. 1
20-Sep	Scale & Generalization	Lab 4	Lab 3 Quiz 3	Ch. 2
27-Sep	Projections	Lab 5	Lab 4 Quiz 4 Map Critique 2	Ch. 3
4-Oct	Grid Coordinate Systems	Lab 6	Lab 5 Quiz 5	Ch. 4
11-Oct	Relief Portrayal: Absolute Methods	Lab 7	Lab 6 Quiz 6	Ch. 9
18-Oct	Relief Portrayal: Relative Methods	Lab 8	Lab 7 Quiz 7 Map Critique 3	Ch. 9
25-Oct	Thematic Maps: Qualitative Data	Lab 9	Lab 8 Quiz 8	Ch. 7
1-Nov	Thematic Maps: Quantitative Data	Lab 10	Lab 9 Quiz 9	Ch. 8
8-Nov	Map Design: Color & Text	Lab 11	Lab 10 Quiz 10 Map Critique 4	Ch. 6
15-Nov	Map Design: Planning & Layout	Lab 12	Lab 11 Quiz 11	Ch. 6

22-Nov	No class: Thanksgiving Break			
29-Nov	Cartographic Production Project	Work on Project	Lab 12 Quiz 12	
6-Dec	Cartographic Production Project	Work on Project	Map Critique 5	
13-Dec	Final Map			

Cartographic Production Project

What is a multivariate thematic map?

A multivariate thematic map involves using multiple variables to represent one or more attributes on a map. You will create a multivariate thematic map on a historical topic of your choice. You will acquire GIS data and create a map that visually communicates two or more variables related to the topic you selected.

Objectives

- 1) Apply the concepts and techniques learned in the semester.
- 2) Learn how and where to acquire GIS data.
- 3) Design a layout using visual hierarchy, balance, and figure-ground of text and graphics to quickly communicate the subject and purpose of the map.
- 4) Have your peers critique your work, and in turn, revise your final map. Interpretation, evaluation and criticism are of critical importance and contributes to the discourse, understanding and appreciation of map design.
- 5) Create your first official map using state of the art ArcGIS software.

Guidelines

- 1) To be multivariate, your map(s) must show two or more data variables.

For the context of this project, your data variables (in order to be considered as variables) should show at least one attribute that varies within the map. For example, I will not consider roads, streams or point locations of cities or buildings to be variables, unless they show varying attributes that are relevant to the thematic topic of the map. If the city symbols were sized according to population and relevant to the purpose of the map, they would qualify as a data variable. Otherwise I will just consider them a data layer or features on the map that are for reference. A map would also qualify as multivariate if you showed just one data layer with more than one varying attribute. For example, a map of census tracts that shows two attributes would be multivariate, e.g. income and cancer mortality. Depending on how you symbolize the census tracts, this would not only be a multivariate map, but a map using multivariate symbols.

- 2) The topic you choose is completely up to you. It is likely that the biggest limitation to picking your topic will be availability of data. After picking a broad topic, I recommend that you look into what data is available before you pinpoint exactly what you will map.
- 3) You can certainly incorporate GIS analysis into your project, but remember this is a cartographic project, not a spatial analysis project. I will grade the map design and ability of the map to communicate your specific topic, and what you did to get the data.

Project Checklist

Below are the milestones required to complete the cartographic production project. See course syllabus in Blackboard for exact due dates. See the pages below for details on deliverables.

Step	Deliverables	Directions
1	Project proposal (40%)	Write a proposal for the cartographic production project. See below for directions.
2	Complete draft of map for peer review (20%)	Complete a draft of your map. See below for submission directions.
3	Perform two peer reviews of draft projects (10%)	You will perform this step in class.
4	Submit final revised map (30%)	Make improvements to your map project based on feedback. See below for submission directions.

Project Proposal

In at least 500 words (although it can be longer), craft a proposal that discusses:

- the map topic (and the reason you selected it)
- the intended audience
- the data variables you envision mapping
- data sources (and if data has been acquired)
- the type of map representation you envision using (e.g. multivariate point symbols, choropleth, dot density, etc)

Assume that the proposal will be read by non-experts. In other words, include background and context information that will allow me to understand your idea. If you were inspired by other sources, you can include a copy or a link in your document. As I review your proposal, I will consider the following questions:

- Can I visualize the map that is being proposed?
- Does the map's purpose seem logical?
- Is the map's purpose clear?
- What data will be used to communicate the map's purpose to map readers?
- Why is the chosen data relevant/important?
- How will the map communicate the data?

Make sure your proposal includes the link(s) to the site(s) where you will be acquiring the data to be used in the project. This will validate the feasibility of your project so you avoid getting stuck at the stage of acquiring data when you should be well into designing your map. You may want to open and test the data in ArcMap to determine the quality, suitability, and reliability of the source.

*** Upload proposal to Blackboard***

Map Draft

You will submit a solid draft of the design, symbolization, and layout of your map, including basic map elements (title, legend, text, scale, north arrow, etc...).

Please submit a pdf file of your map. Here are the steps to save your map as a PDF:

- File > Export Map...
- Navigate to appropriate folder (wherever you have your data-“NOT THE LOCAL DRIVE”).
- Using your name, name it "lname_firstname_Draft"
- Save as type: PDF
- In the expanded options menu, on the General tab, set the Resolution to 100 dpi. (72 dpi is suggested for online images, and 300 dpi for final production. This will make the images a bit larger when viewed at full size, and one can look at details when zoomed in).
- Click the Save button

*** Upload file to Blackboard***

Peer Reviews

Review the draft of two peers by providing in-depth comments of your “CONSTRUCTIVE” critique of their work. To write your reviews, please address the following:

- the reading of the map as a whole; discuss what is unclear or could be better communicated
- the layout, visual hierarchy, figure-ground and/or the graphic design of the map
- the representation and/or symbolization, e.g. do the visual variables fit with the logic of the data?
- the labeling and typography, e.g. are text sizes consistent and logical for page and visual hierarchy?
- other comments, thoughts, ideas, suggestions that might not be touched on in the above bullets

Type your reviews in a word document and upload the file to Blackboard

Final Map

Congratulations! You have reached the final set of deliverables for this project. Once your map project has been thoroughly reviewed by at least two peers, and the instructor, revise or rework your map accordingly. You may not take all ideas or recommendations for changes from reviewers, for example, if you do not have the data, or do not agree with the recommendations.

Please submit the final version of your map. Note that the final product must be “POSTER SIZE”. You can use Kinkos/FedEx or the printing office of the university to print the poster size map.

In addition to completing the map, please write a review or reflection of your own map. In this document, discuss the decisions behind making your map, what you changed from the draft as a result of the peer reviews, or if you did not incorporate recommendations, the reasons why. Also discuss strengths and weaknesses of the map, and how the project may be improved, e.g. with more time or better data.

Type your reflection in a word document and upload file to Blackboard

Consultation/Meetings

I expect you to consult with me constantly throughout the semester as you work on the project. If desired by the class, we can meet once a week, every other week, or as needed outside regular class time. We can use these meetings as check points to guard rail the progression of projects. These meetings can also serve as brainstorming and/or troubleshooting sessions as you may encounter problems or questions. Finally, if you would like some examples of projects or would like to meet with me in private to discuss any concerns, please see me during office hours.

Cartography & GIS

Lab 3- Scale

Key conversions

- 1° of latitude = 69 miles or 111.133 kilometers
- 1° of longitude = $\cos(\text{latitudinal degree}) \times 1^\circ$ of latitude
- 1 mile = 5,280 feet or 63,360 inches or 1.609 kilometers
- 1 nautical mile = 6,076.1 feet
- 1 kilometer = 1,000 meters
- 1 meter = 100 centimeters
- 1 centimeter = 10 millimeters
- 1 yard = 3 feet
- 1 foot = 12 inches
- 1 inch = 2.54 centimeters

Part I. Working with large and small scales

A) Rank the following RF scales from large to small

- 1:62,500
- 1:2,000,000
- 1:24,000
- 1:250,000

B) Rank the following RF scales from large to small based on their areal extent

- 1:62,500
- 1:2,000,000
- 1:24,000
- 1:250,000

C) For the map scales below, find what an inch on the map corresponds to in ground distance. Provide your answer in feet.

- 1:62,500
- 1:2,000,000
- 1:24,000
- 1:250,000

Part II. Converting scales

A) Convert the following RF scales into (1 inch to x feet) word statements

- 1:62,500
- 1:2,000,000
- 1:24,000
- 1:250,000

B) Convert the following RF scales into (1 inch to x miles) word statements

- 1:62,500

1:2,000,000
1:24,000
1:250,000

C) Convert the following RF scales into (1 inch to x kilometers) word statements

1:62,500
1:2,000,000
1:24,000
1:250,000

Part III. Find the solution

A) On a map of 1:40,000 scale, the distance measured between points A and B is 7.3 inches. What ground distance in miles and kilometers does this represent?

B) On a map of 1:10,000 scale, you are asked to draw a fence that is 2 miles long. How many inches of fence will you have to draw on the map?

C) On a map of 1:30,000 scale, the distance between points A and B measures 1.5 inches. On an air photo, the distance between the same points A and B measures 3.7 inches. What is the air photo's representative fraction (RF)?

Part IV. Working with satellite images of unknown scales

A) Find the RF of the image titled "Lafayette_1".

B) Find the RF of the image titled "Lafayette_2".

Hint: I recommend you use the measuring tool available in the PDF file.

Part V. Hands-on map practice

A) Use Las Pulgas Canyon topographic map to answer the following questions.

- 1) What is the RF scale of the map?
- 2) Which scale bars are available in the map?
- 3) A minute of latitude, is equivalent to how many inches on this map?
- 4) A minute of longitude, is equivalent to how many inches on this map?
- 5) State the latitudinal extent of the map in miles
- 6) State the longitudinal extent of the map in miles
- 7) Why do we have a discrepancy between the latitudinal and longitudinal extents, if they are both 7.5 minutes in length.

B) On the Las Pulgas Canyon topographic map, find the map and ground distances between the following points. State the map distance in inches, and the ground distance in miles. Hint: I recommend you use the measuring tool available in the PDF file.

Point A: $33^{\circ}20'42''\text{N}$, $117^{\circ}26'03''\text{W}$
Point B: $33^{\circ}16'40''\text{N}$, $117^{\circ}24'02''\text{W}$
Point C: $33^{\circ}21'17''\text{N}$, $117^{\circ}29'26''\text{W}$

Map distance between A and B

Ground distance between A and B

Map distance between A and C

Ground distance between A and C

Map distance between B and C

Ground distance between B and C

*****Please upload your completed assignment to Blackboard by the stipulated deadline*****