Syllabus for NRM F338

Introduction to Geographic Information Systems

Instructor: Dr. Christine (Chris) Waigl
UAF Geophysical Institute
University of Alaska Fairbanks

Fall 2019

1 Course information

Title: Introduction to Geographic Information Systems (GIS)
Number: NRM F338
CRNs: 74698 (section F01) / 75839 (section F02)
Credits: 3
Course type: In person
Class sessions: Tuesday & Thursday 9:45 - 11:15, Reichardt 202
Lab: Tuesday 14:00-17:00 pm (section F01) or Wednesday 11:15-14:15 (section F02), O'Neill 359

2 Course description

Geographic data concepts including mapping systems, data sources, editing data, GIS analysis and computer mapping. Introduction to global positioning systems. GIS applications in natural resources management.

3 Learning outcomes

Students will become confident:

- applying GIS concepts to geospatial data independently of software package
- formulating and answering GIS problems
- using commercial GIS software (ArcGIS Pro) autonomously for geospatial data analysis and visualization
- finding and using Alaskan and Arctic geospatial data appropriate to natural resources management and geospatial science questions

4 Instructor information

My name is Christine Waigl. I hold a PhD in Geophysics (Remote Sensing) and specialize in satellite and aerial remote sensing of wildfire in Alaska and the circum-polar North. I am interested

in using machine learning methods to develop products for the detection and characterization of wildfires, fire-related hazards, active fire behavior and post-fire impacts.

You can call me Dr. Waigl or Chris, as you prefer. More information about me:

email: cwaigl@alaska.edu
office: O'Neil 302 and WRRB 208
office hours: Tuesdays 12:30-14:00, O'Neill office, or by appointment via email
pronouns: she, her, hers

5   Evaluation

Grades are based on points that are attributed as follows:

- 12 weekly Blackboard quizzes, 20 points each = 240 possible points
- Online mid-term exam = 100 possible points
- Online final exam = 100 possible points
- Lab and class participation = 100 possible points
- **Sum = 540 possible points**

In a given week, the quiz covers the material of **two** weeks previously and based on the work students did in the supervised lab, and the practice problem sets students solve independently. Quizzes will be made available on Monday, and students have at least 24 h to complete the weekly quiz (by 2 pm on Tuesday). Late submissions will be accepted, but if no prior arrangements have been made, can receive a maximum of 50% of the points of an on-time quiz.

Points are converted to letter grades as follows:

- 525 - 540 points = A+
- 500 - 524 points = A
- 485 - 499 points = A-
- 475 - 484 points = B+
- 455 - 474 points = B
- 445 - 454 points = B-
- 430 - 444 points = C+
- 415 - 429 points = C
- 400 - 414 points = C-
- 385 - 399 points = D+
- 365 - 384 points = D
- 350 - 364 points = D-
- < 350 points = F

The instructors reserve the right to make adjustments to this scale based on class performance and factors that develop throughout the semester.

An incomplete (I) is a temporary grade used to indicate that the student has satisfactorily completed (C (2.0) or better) the majority of work in a course but for personal reasons beyond the student's control, such as sickness, has not been able to complete the course during the regular semester. Normally, an incomplete is assigned in a case when the student is current in the class

until at least the last three weeks of the semester or summer session. Negligence or indifference are not acceptable reasons for an I grade. Normally, a student will initiate a request for an incomplete.

6 Course schedule

The course will proceed by weekly topics. Tuesdays will be focused on direct instruction and workshop-style learning, Thursdays will be reserved for lab led by your TA. the following course schedule is preliminary.

Week	Dates	Lab topic	Assignments
1	Aug 27-29	What is GIS? First contact with ArcGIS Pro	
2	Sep 3-5	Basic geodesy, GPS, and measuring things: location, distance, area, depth, time	
3	Sep 10-12	Coordinate systems and projections	Quiz 1 due Tue 2 pm
4	Sep 17-19	Data and file formats for feature collections	Quiz 2 due Tue 2 pm
5	Sep 24-26	Analyzing attribute data	Quiz 3 due Tue 2 pm
6	Oct 1-4	Creating and editing vector GIS data	Quiz 4 due Tue 2 pm
7	Oct 8-10	Containers and databases for vectors and rasters	Quiz 5 due Tue 2 pm
8	Oct 15-17	Mid-term sample exams	Mid-term exam during lab & Quiz 6 due Tue 2 pm
9	Oct 22-24	Digital elevation models	Quiz 7 due Tue 2 pm
10	Oct 29-31	Georeferencing rasters	Quiz 8 due Tue 2 pm
11	Nov 5-7	Supervised classification	Quiz 9 due Tue 2 pm
12	Nov 12-14	Geospatial analysis and spatial joins	Quiz 10 due Tue 2 pm
13	Nov 19-21	Map layouts and cartography	Quiz 11 due Tue 2 pm
14	Nov 26	Finals preparation	NO LAB (Thanksgiving)
15	Dec 3-5	Wrap-up	Finals during lab & Quiz 12 due Tue 2 pm

7 Course policies

- Lecture notes and lab assignments for each week will be posted online via Blackboard.
- Please let the instructor know as early as possible if you cannot attend a lab. Students assigned to either section are free to attend the other section's time slot for catch-up and practice, within the limit of available seats.
- The computer lab room, O'Neill 359 (overflow lab O'Neill 330), is at your disposal for practice between 9 am and 4:30 pm, except when occupied by other classes.
- Please note that the UAF academic misconduct policy regarding plagiarism, cheating, falsification and tampering does, of course, apply. See https://uaf.edu/csrr/student-conduct/academic-misconduct.php .

8   Course materials

This course does not use a set textbook. Occasional readings will be assigned in the course of the class. Finding and using software documentation online is part of the skills students are expected to practice during labs and study.

The course makes intense use of GIS software installed in the SNRE computer lab (O'Neill 359 and 330). The principal software we will use is ESRI ArcGIS Pro (version 2.4). ESRI provides temporary student licenses for home use by students. However, key learning objectives are largely independent of the particular software package used, and ArcGIS Pro is a resource-hungry application and requires a recent, powerful Windows workstation. If students wish to install GIS software on their personal computers, the following options exist:

- ArcGIS Pro 2.4 —contact the instructor, who will add you to the UA ESRI online portal
- ArcMap 10.7 —fill out form here: `https://www.esri.com/en-us/landing-page/lp/education-promo`
- QGIS 3.8 (open-source, runs on Windows, OS X and GNU/Linux): `https://qgis.org/en/site/`

The hands-on GIS problems, including the work required to solve quizzes and exams, can be carried out in any of these three packages. However, ArcMap and QGIS will likely require some more effort on the part of the students to figure out the tools that work slightly differently than ArcGIS Pro.

Students are advised to bring a portable USB drive to store their lab and practice data.

9   Student protection statement

All qualified students are welcome in my classroom. As needed, I am happy to work with you, disability services (`http://www.uaf.edu/chc/disability.html`), rural student services, veteran services etc. to find reasonable accommodations.

Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. If I notice or am informed of certain types of misconduct, I am required to report it to the appropriate authorities. If you believe you are experiencing discrimination or any form of harassment including sexual harassment/misconduct/assault, you are encouraged to report that behavior. If you report to a faculty member or most university employees, including your instructors, they must notify the UAF Title IX Coordinator about the basic facts of the incident. However, you are not obliged to provide any details you do not wish to.

You can find resources for reporting at the UAF Title IX Office. There are a number of options for reporting confidentially. The University of Alaska is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: Learn more about UA's notice of nondiscrimination.