

**NRM F338 Introduction to Geographic Information Systems**  
**Fall 2023, 3 credits, CRN: 73234 (901), 73235 (701), 73236 (702), 73756 (004)**

**Time:** Lecture (O'Neill 307): MW 9:30 – 11:00 am  
Lab Sections (901, 701): T 2 – 4 pm; Lab Section (702): W 2 – 4 pm

**Place:** Lecture: **O'Neill 307** or Zoom; Lab: **WRRB 004** or Zoom  
**LMS:** Canvas [CRN: 73756 (004) will be fully asynchronous]  
**Instructor:** Santosh Panda, Dept. of Natural Resources and Environment  
Ph: 474-7539; [skpanda@alaska.edu](mailto:skpanda@alaska.edu); Office: O'Neill Building 368  
(office hours: MW: 11:00 am – 11:45 am /by appointment)

**Teaching Asst.:** Ms. Sumana Sahoo (Email: [ssahoo2@alaska.edu](mailto:ssahoo2@alaska.edu)) Office: Zoom or O'Neill ### (Office hours: TBD)

**Course type:** Combined Lecture/Lab

**Technology requirements:** Esri ArcGIS Pro software. Students will get access to this software from 3 sources: 1) have it on their personal computer, 2) through OIT virtual lab space, and 3) computer labs (WRRB 004 and O'Neill 359).

**Course Description:** Geographic data concepts including mapping systems, data sources, editing data, GIS analysis and computer mapping. GIS applications in natural resources management. **See course calendar on the last page of this document.**

**Instructional Methods:** Lecture, discussion, and lab exercises

- Lectures and labs will be the primary mode of instruction. Most lectures will be supplemented with computational examples to prepare students for the assignments.
- All lectures will be recorded and posted on Canvas the same day.
- Weekly lab instruction will be posted on Canvas every Friday.
- Weekly assignments (along with general course information and handouts) will be posted on Canvas every Saturday.

**Course Goals:** This class covers introduction to various geographic data and science concepts and application of geospatial methods in the field of natural resources, geography, biology, and geosciences. It includes analyses of points, lines, polygons, raster, and 3D data in ESRI ArcGIS Pro software. We will analyze feature data (points, lines, and polygons) during the first-half of the semester, and raster and 3D elevation data during the second-half of the semester.

**Student Learning Outcomes:** Successful completion of the course will allow students to:

- Be proficient in handling geospatial data in Esri ArcGIS Pro program
- Be proficient in the application of Geoprocessing tools in Esri ArcGIS Pro program
- Use GIS analysis to solve geospatial problem in the field of natural resources, geography, biology, and geosciences
- Develop a workflow that builds on the concept of the GIS analysis to move from raw data to results
- Communicate results through maps, graphs, and ArcGIS StoryMap

**Evaluation:** Grades are based on the points (and point percentage) that are attributed as follows:

12 weekly lab completion, 20 points each (due Fridays; 5% bonus for on time submission)  
10 weekly assignments, 10-20 points each (due Saturdays; 5% bonus for on time submission)  
One midterm exam, 30 points  
One final exam, 60 points  
80% attendance in lectures (2% on your final semester score)

**Grading criteria:**

A (A+: > 94%, A-: > 90%)  
B (B+: > 80%, B-: > 70%)  
C (C+: > 60%, C-: > 50%)  
D (D+: > 45%, D-: > 40%)

**Course Policies:**

- Attendance: All students in synchronous sections are expected to attend and participate in all lectures and labs. At the end of the semester students with 80% or more attendance in lectures will get a bonus 2% on your final semester percentage.
- Participation and Preparation: Students are expected to come to class with assigned reading and other assignments completed.
- Late quizzes will be accepted with a 5% penalty per day late.

**Special Needs:** Every qualified student is welcome in my classroom. As needed, I will work with you, disability services, veterans' services, rural student services to find reasonable accommodations in my class. Students with learning or other disabilities who may need classroom accommodations are encouraged to visit the Disabilities website at <https://uaf.edu/disabilityservices/> and make an appointment with the Office of Disability Services (474-5655). Please meet with the instructor so that the appropriate accommodations and support to assist in meeting the goals of the course can be made in collaboration with the Office of Disability Services.

**UAF Honor Code:** As a UAF student, you are subject to the student Code of Conduct. The university assumes that the integrity of each student and of the student body as a whole will be upheld. It is your responsibility to help maintain the integrity of the student community. For additional information, contact the Center for Student Rights and Responsibilities or web <https://uaf.edu/csrr/>. The UAF Honor Code (Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks.

**Title IX Information:** Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. As required, if I notice or am informed of certain types of misconduct, then 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 any university employee, they must notify the UAF Title IX Coordinator about the basic facts of the incident. Your choices for reporting include:

1. You may access confidential counseling by contacting the Student Health and Counseling Center at 474-7043; <https://uaf.edu/chc/>
2. You may access support and file a Title IX report by contacting the UAF Title IX Coordinator at 474-7300; <https://uaf.edu/titleix/contact.php>

3. You may file a criminal complaint by contacting the University Police Department at 474-7721.

University of Alaska is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: [alaska.edu/nondiscrimination](http://alaska.edu/nondiscrimination).

Effective communication: Students who have difficulties with oral presentations and/or writing are strongly encouraged to get help from the UAF Department of Communication's Speaking Center (907-474-5470, [speak@uaf.edu](mailto:speak@uaf.edu)) and the UAF English's Department's Writing Center (907-474-5314, Gruening 8<sup>th</sup> floor).

**Student protections statement:** UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: <https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

**Disability services statement:** I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

**ASUAF advocacy statement:** The Associated Students of the University of Alaska Fairbanks, the student government of UAF, offers advocacy services to students who feel they are facing issues with staff, faculty, and/or other students specifically if these issues are hindering the ability of the student to succeed in their academics or go about their lives at the university. Students who wish to utilize these services can contact the Student Advocacy Director by visiting the ASUAF office or emailing [asuaf.office@alaska.edu](mailto:asuaf.office@alaska.edu).

#### **Student Academic Support:**

- Speaking Center (907-474-5470, [uaf-speakingcenter@alaska.edu](mailto:uaf-speakingcenter@alaska.edu), Gruening 507)
- Writing Center (907-474-5314, [uaf-writing-center@alaska.edu](mailto:uaf-writing-center@alaska.edu), Gruening 8th floor)
- UAF Math Services, [uaf-traccloud@alaska.edu](mailto:uaf-traccloud@alaska.edu), Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List ([https://www.uaf.edu/advising/lr/SKM\\_364e19011717281.pdf](https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf))

#### **Student Resources:**

- Disability Services (907-474-5655, [uaf-disability-services@alaska.edu](mailto:uaf-disability-services@alaska.edu), Whitaker 208)
- Student Health & Counseling [**6 free counseling sessions**] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Gruening 215)
- Center for Student Rights and Responsibilities (907-474-7317, [uaf-studentrights@alaska.edu](mailto:uaf-studentrights@alaska.edu), Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, [asuaf.office@alaska.edu](mailto:asuaf.office@alaska.edu), Wood Center 119)

**Nondiscrimination statement:** The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions,

parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination). For more information, contact: UAF Department of Equity and Compliance  
1692 Tok Lane, 3rd floor, Constitution Hall, Fairbanks, AK 99775  
907-474-7300  
uaf-deo@alaska.edu

We want you to know that:

1. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination).
2. Incidents can be reported to your university's Equity and Compliance office (listed below) or online reporting portal. University of Alaska takes immediate, effective, and appropriate action to respond to reported acts of discrimination and harassment.
3. There are supportive measures available to individuals that may have experienced discrimination.
4. University of Alaska's Board of Regents' Policy & University Regulations (UA BoR P&R) 01.02.020 Nondiscrimination and 01.04 Sex and Gender-Based Discrimination Under Title IX, go to: <http://alaska.edu/bor/policy-regulations/>.
5. UA BoR P&R apply at all university owned or operated sites, university sanctioned events, clinical sites and during all academic or research related travel that are university sponsored.

For further information on your rights and resources [click here](#).

**Course Calendar:** The course will proceed by weekly topics:

Week 1: 8/28 - 8/30	Introduction to GIS and Introduction to ArcGIS Pro Software Lab 0: Esri ArcGIS Pro software access and orientation Ungraded Assignment: Practice Lab 0 demo; Read <a href="#">Maps Create Compelling Connections</a>
Week 2: 9/4 - 9/6	GIS terminology, Basemaps and ArcGIS Geoprocessing tools Lab 1: Getting started with ArcGIS Pro Assignment 1: Point analysis in ArcGIS Pro
Week 3: 9/11 - 9/13	Geographic Coordinate Systems (Geoid, Ellipsoid/Spheroid, Datum) Lab 2: Taking measurements in GIS Assignment 2: ArcGIS Pro Lingo and tools
Week 4: 9/18 - 9/20	Projected Coordinate Systems (UTM, Alaska Albers, and Alaska State Plane) Lab 3: GIS Coordinate Systems and Map Projections Assignment 3: Distance measurement errors in projected coordinate systems
Week 5: 9/25 - 9/27	GIS data file formats and GIS web services Lab 4: Working with various GIS files and data formats Assignment 4: Geoprocessing tools
Week 6: 10/2 - 10/4	Creating and editing vector GIS data

	Lab 5: Spatial analysis using attribute data Assignment 5: Open source GIS data sites
Week 7: 10/9 - 10/11	Geoprocessing tools for spatial analysis Lab 6: Creating and editing feature data Assignment 6: Polygon analysis
Week 8: 10/16 - 10/18	Map layouts Lab 7: Working with different map layouts No Assignment; Mid-term (10/18/23)
Week 9: 10/23 - 10/25	Introduction to Digital Elevation Models (DEM) Lab 8: Working with table joins and relates Assignment 7: Map layout challenge
Week 10: 10/30 - 11/1	DEM processing and applications Lab 9: Processing DEM data Assignment 8: Process and analyze DEM data
Week 11: 11/6 - 11/8	Introduction to remote sensing and spectral indices Lab 10: Spectral indices Assignment 9: Advanced DEM processing and analysis
Week 12: 11/13 - 11/15	Introduction to image classifications Lab 11: Image classification Assignment 10: Image classification challenge
Week 13: 11/20	Scanned map and aerial photo georeferencing No Lab and No Assignment (Thanksgiving week)
Week 14: 11/27 - 11/29	Web GIS (ArcGIS StoryMaps and Dashboards) Lab 12: Create an ArcGIS StoryMaps No Assignment
Week 15: 12/4 - 12/6	Wrap up and Revision Lab make up
Week 16: 12/11 - 12/13	Final take-home exam (Assigned 12/11 9 am and due 12/13 9 am)