GISC 5353, GISC 5053
Geographic Information System (GIS) and Geospatial Applications
Spring 2024

Instructor: Dr. I-Kuai Hung  Office Hours: Monday 10AM-12PM
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Lectures:
Thursday 4:30-6:20PM, Forestry 108

Laboratories:
Thursday 6:30-9:00PM, Forestry 108

Course Description:
GISC 5353 GIS and Geospatial Applications. 3 semester hours, 2 hours lecture and 3
hours lab per week. Application of GIS technology to building and maintaining data
bases and analyzing spatial and temporal problems.

Course Contact Hours and Study Hours:
A face-to-face course with 2 hours of direct faculty instruction and 3 hours of lab
instruction per week. In addition, 6 hours of out-of-class per week is expected for
working on assignments and studying course materials.

Program Learning Outcomes:
GIS has become commonplace in a multitude of disciplines. This class outlines the
foundations of spatial analysis in a geographic information system environment with
focus on the universal aspects of spatial data and their analysis.
GISC 5353 is an elective for Spatial Science majors as well as those including
Geospatial Analyst Certificate, Environmental Science, and Forestry who are interested
in advanced level of GIS skills. The course is designed to address the Program Learning
Outcomes in demonstrating proficiency in statistical analysis in spatial science at advanced
level, as well as preparation to pursuit a professional career and/or Ph.D. degree and
competency in oral and written communication skills at mastery level.

Student Learning Outcomes:
Students are introduced key spatial concepts from point pattern to continuous field.
Analytical techniques in GIS environment are discussed. As the semester develops,
students will apply spatial analytical tools to model real-world problems and present their
findings in a geospatial context. They will demonstrate competency in oral and written
communication skills through project preparation and presentation where the professional
ethics is emphasized.
Textbooks:

Required:

Recommended:

Software:
Esri ArcGIS Pro with the Advanced license level and Python.

Lecture Topics:

Course Overview: General descriptions on the course structure, content, schedule, and requirement. Introduction to the online learning management system, Desire2Learn. Review of the elements of statistics.

Geographic Information Analysis: Discussion on the definition of geographic information analysis and the difference between spatial data manipulation, spatial data analysis, spatial statistical analysis and spatial modeling. Discussion on different types of spatial objects and different levels of measurement.

The Properties of Spatial Data: Discussion on problems about spatial data including spatial autocorrelation, modifiable areal unit problem, ecological fallacy, scale, and nonuniformity of space vs. the favorable properties of measurable distance, adjacency, interaction, and neighborhood.

GIS Programming: Introduction to the fundamentals of computer programming and discussion on building customized GIS applications using different programming interfaces including ArcGIS ModelBuilder and the script language of Python.

Maps: Discussion on cartographic traditions and the use of map for scientific visualization, using maps for the exploration of different spatial objects, and the relationship between process and pattern in a map.

Point Pattern Analysis: Discussion on point pattern analysis with different approaches including point density based, point separation based, and the one using both density and distance, and the interpretation of point patterns through statistical analysis.

Spatial Autocorrelation: Discussion on the different types of area object and the definition of spatial autocorrelation. Exploration on different techniques for measuring spatial autocorrelation including global and local approaches.

The Statistics of Fields: Discussion on the different techniques for spatial interpolation including deterministic and stochastic approaches. Exploration on accuracy assessment for spatial interpolation through validation and cross validation.
Map Overlay: Discussion on possible types of map overlay from a geometric view and the use of map overlay for GIS modeling including index model, binary model, and weight of evidence with work examples.

GIS Tools for Map Overlay: Discussion on existing tools for map overlay analysis in GIS software packages with focus on the Fuzzy Overlay and Weighted Overlay in ArcGIS.

Lab and Assignments:
Ten lab assignments will be given throughout the semester. They include data processing in GIS and geospatial data visualization etc.

The assignments will be given online and should be submitted in electronic format onto Desire2Learn. It is the individual student’s responsibility to access his/her D2L account. When uploading an assignment, the name of the student’s file should include the student’s mySFA username at the end following an underscore, e.g. assignment1_hungikua.doc. Failure to follow this filename convention will result in penalty on the grade. A corrected version of assignment can be resubmitted by the deadline. However, no late submission will be accepted.

Important information will also be announced through the email in D2L. It is the student’s responsibility to check his/her email on a regular basis.

Term Project:
Toward the end of the semester, each student will complete an independent project presented to the class. The product will be a poster with the dimension of 42 by 36 inch. While presenting the work, a talk facilitated with PowerPoint along with the poster is required. The talk should run about 20 minutes, with a five-minute question and answer time.

Examination:
A final exam will be given. It will include both concepts and lab work.

Grading Policy:

- 50% Assignments
- 30% Term Project
- 20% Final Exam

A 90+ %
B 80-89%
C 70-79%
D 60-69%
F < 60%

Attendance Policy:
Regular and punctual attendance is expected at all classes, laboratories, and other activities for which a student is registered. Even though attendance is not a factor for the course grades, accurate attendance will be recorded. When an absence is unavoidable, make sure you catch up on what was missed. If a student has excessive absences, the instructor reserves the right not to give individual tutoring, special consideration regarding make-up work, or other help the student needs because of missing class. Plan your time as best as possible and make the commitment to spend the amount of time needed for you to be successful.
Academic Integrity:

It is the instructor’s hope that academic dishonesty will not be a problem in this class. However, academic integrity is a responsibility of all university faculty and students. The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one’s self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

Withheld Grades Course Grades Policy (5.5):

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the coursework because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course to compute the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5.5.pdf.
Students with Disabilities:
To obtain disability-related accommodations, alternate formats, and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004(TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services promptly may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Student Wellness and Well-Being:
SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
The Dean of Students Office (Rusk Building, 3rd floor lobby)
www.sfasu.edu/deanofstudents, 936.468.7249, dos@sfasu.edu

SFA Human Services Counseling Clinic, Human Services, Room 202
www.sfasu.edu/humanservices/139.asp, 936.468.1041

The Health and Wellness Hub “The Hub”
Location: corner of E. College and Raguet St.
www.sfasu.edu/thehub, 936.468.4008, thehub@sfasu.edu

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:
• Health Services
• Counseling Services
• Student Outreach and Support
• Food Pantry
• Wellness Coaching
• Alcohol and Other Drug Education

Crisis Resources:
• Burke 24-hour crisis line: 1.800.392.8343
• National Suicide Crisis Prevention: 9-8-8
• Suicide Prevention Lifeline: 1.800.273.TALK (8255)
• johCrisis Text Line: Text HELLO to 741-741
## Course Calendar:

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<th>Lecture</th>
<th>Lab</th>
<th>Readings</th>
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<td>November</td>
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<td>GIS Tools for Map Overlay</td>
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The instructor reserves the right for the modification of this syllabus.