GISC 5351, GISC 5051
Introduction to Geographic Information System (GIS) and Geospatial Analysis
Fall 2020

Instructor: Dr. I-Kuai Hung
Office Hours: Monday 10AM-12PM
Department: Forestry
Wednesday 10AM-12PM
Office: Forestry 106
Thursday 9AM-11AM
Phone: 468-2464
Email: hungi@sfasu.edu
Website: www.faculty.sfasu.edu/hungikua

Lectures:
Thursday 4:30-6:20PM, Forestry 208/108 or Online

Laboratories:
Session 020 Thursday 6:30-9:00PM, Forestry 108 or Online

COVID-19 MASK POLICY
Masks (cloth face coverings) must be worn over the nose and mouth at all times in this
class and appropriate physical distancing must be observed when meeting face to face.
Students not wearing a mask and/or not observing appropriate physical distancing will be
asked to leave the class. All incidents of not wearing a mask and/or not observing
appropriate physical distancing will be reported to the Office of Student Rights and
Responsibilities. Students who are reported for multiple infractions of not wearing a
mask and/or not observing appropriate physical distancing may be subject to disciplinary
actions.
https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-
guidance.html

In order to maintain social distancing, the lectures and labs will be also made available
online and recorded so that the students have different options.

Course Description:
3 semester hours, 2 hours lecture and 3 hours lab per week. Expanded examination of
GIS theory, concepts, technology, and application.
Course corequisite required GISC 5051.

Program Learning Outcomes:
Geographic Information System (GIS) is a computer system for the management,
analysis, and display of geographic information. GIS includes a set of comprehensive
tools for working with the geographic data. This class outlines the principles of GIS. It is
designed to look into GIS from different views including Geodatabase, Geovisualization,
and Geoprocessing.
GISC 5351 is one of the core courses required of all Spatial Science and most
Environmental Science majors as well as Geospatial Analyst Certificate, and thus
competency is required. The course is designed to address the Program Learning Outcomes in demonstrating proficiency in basic statistical analysis in spatial science at advanced level, as well as preparation to pursue a professional career and/or Ph.D. degree and competency in oral and written communication skills at mastery level.

**Student Learning Outcomes:**

Students will demonstrate competency in the fundamentals of GIS and geospatial analysis. They will learn not only the skills on the most common GIS software but also the necessary backgrounds to understand how the software package works. As the semester develops, students will apply spatial analytical tools to model real-world problems. They will demonstrate competency in oral and written communication skills through project preparation and presentation where the professional ethics is emphasized.

**Textbooks:**

- **Recommended:**

**Software:**

- Esri ArcGIS for Desktop 10.6.1 with Advanced (ArcInfo) license, ArcGIS Pro 2.4, MS Excel and Access.
- There are different options for accessing the software applications.
  1) Go to the GIS Lab during the course lab hours, or any labs in Forestry building where the software is installed when there is no class in session.
  2) Go to https://view.sfasu.edu/ and login with your mySFA credential to access VMware Horizon virtual machine. Select the Forestry machine that has the same configuration as a GIS Lab computer.
  3) Request an activation code from Dr. Hung. It allows to download ArcGIS Desktop and have it installed on your own computer running on Windows operating system. The link to activate the license: https://www.esri.com/en-us/arcgis/products/arcgis-desktop-student-trial.

**Lecture Topics:**

- **Course Overview:** General descriptions on the course structure, content, schedule, and requirement. Introduction to the online learning management system, Desire2Learn.
- **Introduction to GIS:** Brief history and components of GIS, different types of GIS data and applications.
- **ArcGIS Overview:** The architecture of ArcGIS including desktop, mobile, server, and online platforms and their extensions.
- **Map Projection and Coordinate System:** The concepts of datum and spheroid, the different methods of map projection, the difference between geographic coordinate
system and projected coordinate system, and commonly used projected coordinate systems.

Data Display and Cartography: The different types of maps, essential elements of a complete map, symbolization on qualitative data and classification on quantitative data, and cartography conventions.

Vector Data Model and Analysis: The different types of vector data with both georelational data model and object based data model, geoprocessing with vector data including map overlay.

Attribute Data Management: Relational database management for spatial and non-spatial attribute data.

Geodatabase: The object based data model for both vector and raster data including feature class, feature dataset, raster dataset, raster catalog, domain, subtype, relationship, etc.

Raster Data Model and Analysis: The different raster data formats for continuous data, raster based analysis including local, neighborhood, and zonal operations.

Terrain Mapping and Analysis: Digital elevation model and triangulated irregular network for depicting terrain surfaces and their derivatives such as slope, aspect, and hillshade, etc.

Spatial Interpolation: Using data collected at sampled location to estimate for the entire surface area, assessing the accuracy of interpolation.

GIS Modeling: Building models in GIS to streamline complex geoprocessing, different types of model including binary and index models.

Lab and Assignments:

Ten lab assignments will be given throughout the semester. During the first half of the semester, step-by-step guidance on ArcGIS will be offered. As the semester develops, students are supposed to work on the assignments with limited assistance.

The assignments will be given online and should be submitted in electronic format onto Desire2Learn. When uploading an assignment, the name of the student’s file should include the student’s mySFA ID at the end preceding with an underscore, e.g. a1_hungikua.zip. 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.

Lab 1: ArcGIS Exploration
Lab 2: GIS Data Format and Coordinate System/Projection
Lab 3: GIS Data Acquisition
Lab 4: Georeferencing and Editing
Lab 5: Geoprocessing
Lab 6: Geodatabase
Lab 7: Database Management
Lab 8: Terrain Analysis and Spatial Interpolation
Lab 9: 3D Visualization
Lab 10: GIS Models

Important information will also be delivered through Desire2Learn including course materials, emails, discussion, etc. It is the student’s responsibility to check for email
announcements, data availability, and deadlines in Desire2Learn. For D2L technical support, contact student support in the Office of Instructional Technology (OIT) at d2l@sfasu.edu or 936-468-1919. If you call after regular business hours or on a weekend, please leave a voicemail.

**Presentation of Project:**
Throughout the semester, students will work as teams on their final projects. Each team consists of two students and will be scheduled to make a presentation of their project to the class. The talk should run about 20 minutes, with a five-minute question and answer time. Students will learn to interact with each other with professional communication skills and ethics. Visual aid such as PowerPoint for the presentation is required. A typed report to the instructor is also required and due at the end of the semester. The report should have a total of 5 to 8 one-sided pages (not counting cover page) with 12 font size and 1.5 line spacing.

The report should emphasize the methodology and the discussion of the results. Below is a list of suggestions for the project. Students choose their topic of interest but should clear topics with the instructor.

1. On-going research that is related to GIS.
2. Review of journal paper(s) or book chapter(s).
3. Exploration of the functionality of specific features (e.g., Tools, Models, and Extensions etc.) in ArcGIS for Desktop.
4. Online GIS applications.

**Examination:**
One midterm test will be given during the semester and a final exam will be given at the end of the semester. The exams will include both written questions and lab works.

**Grading Policy:**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>50%</td>
<td>Assignments</td>
</tr>
<tr>
<td>15%</td>
<td>Project</td>
</tr>
<tr>
<td>15%</td>
<td>Midterm Test</td>
</tr>
<tr>
<td>20%</td>
<td>Final Exam</td>
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</tbody>
</table>

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

**Attendance Policy:**
According to the University’s 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.

**Acceptable Classroom Behavior:**
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the
Student Code of Conduct, policy 10.4). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic/online forums, classroom meetings, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program http://www.sfasu.edu/judicial/earlyalert.asp. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

Responsible Use of Technology:
It is expected that all students will only use cell phones, PDAs, laptop computers, MP3 players and related devices outside of class time or when appropriate in class. Answering a cell phone, texting, listening to music or using a laptop for matters unrelated to the course may be grounds for dismissal from class or other penalties.

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. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete Student Academic Dishonesty Policy at http://www.sfasu.edu/policies/student_academic_dishonesty.pdf.

Withheld Grades Course Grades Policy (5.5):
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 course work 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, except as allowed through policy [i.e., Active Military Service (6.14)]. If students register for the same course in future semesters the WH will
automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

**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 in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

**Ph.D. Students:**
If necessary, Ph.D. students should schedule a meeting with the instructor to discuss special course content deemed required to support their research.
## Course Calendar:

<table>
<thead>
<tr>
<th>Month</th>
<th>Day</th>
<th>Lecture</th>
<th>Reference (Chang)</th>
<th>Laboratory</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>August 27</td>
<td>Course Overview</td>
<td></td>
<td>Lab Orientation</td>
</tr>
<tr>
<td>2</td>
<td>September 3</td>
<td>Introduction to GIS</td>
<td>Ch. 1</td>
<td>1. ArcGIS Exploration</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>ArcGIS Overview</td>
<td>Ch. 5</td>
<td>2. GIS Data Format and Coordinate System/Projection</td>
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<tr>
<td>4</td>
<td>17</td>
<td>Map Projection and Coordinate System</td>
<td>Ch. 2</td>
<td>3. GIS Data Acquisition</td>
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<td>5</td>
<td>24</td>
<td>Data Display and Cartography</td>
<td>Ch. 9</td>
<td>4. Georeferencing and Editing</td>
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<tr>
<td>6</td>
<td>October 1</td>
<td>Vector Data Model and Analysis</td>
<td>Ch. 3 &amp; 11</td>
<td>5. Geoprocessing</td>
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<tr>
<td>7</td>
<td>8</td>
<td>Attribute Data Management</td>
<td>Ch. 8 &amp; 10</td>
<td>6. Geodatabase</td>
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<td>8</td>
<td>15</td>
<td>Geodatabase</td>
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<td>9</td>
<td>22</td>
<td><strong>Midterm Test</strong></td>
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<td>10</td>
<td>29</td>
<td>Raster Data Model and Analysis</td>
<td>Ch. 4, 6 &amp; 12</td>
<td>7. Database Management</td>
</tr>
<tr>
<td>11</td>
<td>November 5</td>
<td>Terrain Mapping and Analysis</td>
<td>Ch. 13 &amp; 14</td>
<td>8. Terrain Analysis and Spatial Interpolation</td>
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<tr>
<td>12</td>
<td>12</td>
<td>Spatial Interpolation</td>
<td>Ch. 15</td>
<td>9. 3D Visualization</td>
</tr>
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<td>13</td>
<td>19</td>
<td>GIS Modeling</td>
<td>Ch. 18</td>
<td>10. GIS Models</td>
</tr>
<tr>
<td>14</td>
<td>26</td>
<td><strong>Thanksgiving Holiday</strong></td>
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<tr>
<td>15</td>
<td>December 3</td>
<td>Student Presentations</td>
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<tr>
<td>16</td>
<td>10</td>
<td><strong>Final Exam (4:15 – 7:15PM)</strong></td>
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*The instructor reserves the right for the modification of this syllabus.*