

South Dakota State University

GEOG 474/574 - S01, 3 credits **GIS: Vector and Raster Modeling** Course Syllabus (Spring 2022)

Instructor: Dapeng Li, Ph.D., GISP
Meeting Time: Tue. 3:00 - 4:50 pm
Meeting Location: Wecota Hall, Room 100
Office Hours: Tue. & Wed. 1:00 - 3:00 pm (or by appointment)
Office: Wecota Hall 115D
Phone: (605) 688-4620
Email: dapeng.li@sdstate.edu (primary contact)
Zoom: <https://sdstate.zoom.us/my/lidapeng>

Lab Section

SECTION	LAB INSTRUCTOR	DAYS	LOCATION	MEETING TIME
474/574L S01	Thomas White	Thur.	Wecota Hall 014	3:00 PM – 4:50 PM

Course Description

This course is an advanced course on Geographic Information Systems (GIS) and introduces various GIS modeling techniques. Topics include weighted suitability modeling, path finding, modeling viewsheds, and spatial hydrologic modeling, etc. Meanwhile, this course also aims to help students develop advanced ArcGIS skills (ArcGIS Pro).

Course Prerequisites

GEOG 372 Introduction to GIS or equivalent course/experience

Instructional Methods

Lecture, discussions, demonstrations, lab assignments, final project, and presentation

Student Learning Outcomes

Knowledge Outcomes

Upon the completion of this course students will be able to:

- Master the fundamental concepts and principles of GIS modeling.
- Learn how to use GIS to design and implement a spatial model.

- Understand the personal implications of knowing about GIS.

Skills Outcomes

Students will develop the following skills:

- Assess the quality of various GIS models
- Use different GIS models in real projects
- Know how to keep on learning about GIS modeling after the course is over.

Other skill outcomes include written communication, interpersonal communication, professional presentation, and planning and organization. Lastly, students are expected to be more interested in using GIS in their research/work after taking this course.

Course Requirements

Required Text

Chang, K.T. (2018). *Introduction to Geographic Information Systems* (9th edition). McGraw-Hill Education (ISBN: 978-1260136388)

De Smith, M. J., Goodchild, M. F., & Longley, P. (2018). *Geospatial analysis: a comprehensive guide to principles, techniques and software tools*. Troubador Publishing Ltd. (free online at <http://www.spatialanalysisonline.com>)

Optional Readings

Bolstad, P. (2019). *GIS Fundamentals: A first text on geographic information systems* (6th edition). XanEdu Publishing Inc. (ISBN: 978-1593995522)

Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic information systems and science* (4th edition). John Wiley & Sons.

(Other readings may also be assigned and will be provided accordingly.)

Lab Materials

Students will also need (at least) an 8 GB Flash Drive to store their lab and final project materials. All the data on the lab computers will be automatically wiped out when the computers are rebooted. SAVE YOUR FILES!!!

Attendance Policy

Attendance and full participation in classes is expected of all students. Attendance will be checked periodically. The class participation credit is given based on class attendance and/or in-class/take-home exercises.

Classroom Policies

- All cell phones need to be turned off or silenced during the class/lab.
- No recording (photos, audio, etc.) without permission.
- Using computers/smartphones to surf the internet or work on other tasks is not allowed.

Important Dates:

- January 10, Monday First day of class

- January 17, Monday Martin Luther King Day Holiday
- January 19, Wednesday Last day to drop or add and adjust final fees
- January 20, Thursday “W” grade begins
- February 21, Monday Presidents’ Day Holiday
- March 7, Monday First Half Spring Term ends
- March 10, Thursday Deficiency reports due by midnight
- March 14-18, Monday – Friday Spring Break (No Class)
- April 4, Monday Last day to drop a course
- April 15-April 17, Friday – Sunday Easter Recess
- May 2-May 6**, Monday – Friday Final exams
- May 11, Wednesday Grades due by midnight

Evaluation Procedures

Grade Evaluation

Evaluation Components	Points (each)	Points	Percent Value
Participation	TBD	100	10%
Lab Assignments (5)	80	400	40%
Final Presentation	100	100	10%
Final Paper	400	400	40%
Total		1000	100%

Course Grade Scale

Grade	Final weighted points
A	90-100
B	80-89
C	70-79
D	60-69
F	< 60

Grading Policy

Lab Assignment: In the lab section, we will use ArcGIS Pro to reinforce the concepts covered in the lecture. Although class time has been allocated for lab tutorials and assignments, additional work may also be necessary. Attendance to all of the labs is required. Lab assignments must be submitted electronically through the Dropbox in D2L on time. 10% of the points will be deducted each day for late submissions (Please check D2L for specific due dates).

Final Project: The students are expected to use what they have learned in the class to accomplish a final project. The project is about compiling relevant data, organizing the data in a geodatabase, performing some analysis, and mapping out the results for a specific application. The project must be original work. Thus, the students are STRONGLY encouraged to discuss with the instructor regarding project ideas as early as possible.

Specifically, the final project should include the following components:

1. A 1-2 page summary of the project that introduces the topic and relevant research questions or objectives.
2. A project proposal that includes introduction, background, data, methods, and expected results. (within 8 pages (including figures), word count: 800~1,500 (undergraduate), 1,500~2,000 (graduate))
3. A PowerPoint presentation (about 15 minutes) that summarizes the key steps in the project.
4. A final paper that consists of title, introduction, literature review, data, methods, results, discussion, and conclusion (10 ~ 25 pages (double-spaced); word count: 2,000~3,000 (undergraduate), 3,000~4,000 (graduate)). APA format should be used in the final report, and students are strongly encouraged to use EndNote to manage the citations.

The instructor will provide timely feedback for each component. More details on each component will be provided during the semester. Please refer to D2L for specific due dates.

Class Participation: The course requires a regular attendance in BOTH lectures and labs. Student participation in class discussion and interaction is strongly encouraged. I will check attendance periodically. The class participation credit is given based on class attendance and in-class/take home exercises/quizzes.

Course Schedule

Date	Lecture Topic	Readings	Lab
1/11	Course Overview & Introduction	Syllabus	No Lab
1/18	Introduction to GIS Modeling	C Ch. 2, 9, 18	Assignment 1
1/25	Vector Data Analysis	C Ch. 3, 11	Assignment 2
2/1	Raster Data Analysis	C Ch. 4, 12	Assignment 3
2/8	Distance & Least-Cost Path Analysis	C Ch. 17	ESRI Training Session
2/15	Network Analysis	C Ch. 17	Assignment 4
2/22	Terrain Mapping & Analysis	C Ch. 13	ESRI Training Session
3/1	Viewshed Analysis	C Ch. 14	Assignment 5
3/8	Watershed Analysis	C Ch. 14	ESRI Training Session
3/15	Spring Break (No Class)	N/A	No Lab
3/22	Regression Analysis	TBA	ESRI Training Session
3/27	Extended Abstract Due in D2L by midnight		
3/29	Accessibility	TBA	ESRI Training Session
4/3	Final Project Proposal Due in D2L by midnight		
4/5	Proposal Presentations	N/A	Project Time
4/12	Agent-based Modeling	TBA	Project Time
4/19	Project Advising & Support	N/A	Project Time
4/26	Final Presentation (3:00 – 4:50 pm, Zoom)		
5/2	Final Paper Due in D2L by 6:00 pm (Monday)		

Abbr.: Chang (C)

This schedule is subject to change. Students will be notified of any changes.

ADA Statement

South Dakota State University strives to ensure that physical resources, as well as information and communication technologies, are reasonably accessible to users in order to provide equal access to all. If you encounter any accessibility issues, you are encouraged to immediately contact the instructor of the course and the Office of Disability Services (Phone: 605-688-4504; Fax: 605-688-4987; E-mail: Nancy.Crooks@sdstate.edu or DSU.Disabilityservices@sdstate.edu; Address: Room 271, Box 2815, University Student Union, Brookings South Dakota 57007)

Freedom in Learning Statement

Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be evaluated solely on an academic basis and students should be free to take reasoned exception to the data or views offered in any courses of study. Students who believe that an academic evaluation is unrelated to academic standards but is related instead to judgment of their personal opinion or conduct should first contact the instructor of the course. If the student remains unsatisfied, the student may contact the Department Head, Dean, or both, of the college which offers the class to initiate a review of the evaluation.

Student Academic Integrity and Appeals

The University has a clear expectation for academic integrity and does not tolerate academic dishonesty. University Policy 2:4 sets forth the definitions of academic dishonesty, which includes but is not limited to, cheating, plagiarism, fabrication, facilitating academic dishonesty, misrepresentation, and other forms of dishonesty relating to academics. The policy and its procedures also set forth how charges of academic dishonesty are handled at the University. Academic Dishonesty is strictly proscribed and if found may result in student discipline up to and including dismissal from the University.

TurnItIn

All written assignments in D2L will be automatically submitted to TurnItIn for plagiarism detection. Students should make sure that the assignments are their original work before they submit them in D2L. Students should check the similarity score of their submitted documents to ensure that the assignments pass the test.

Classroom Participation and Attendance

SDSU will return to pre-COVID-19 class attendance policy. Classroom participation and in-person interaction are integral components of the education process for face-to-face courses and the university expects students enrolled in those courses to be physically present for scheduled in-person class sessions. Students are also expected to inform the instructor if absent due to illness. SDSU has installed many cameras and microphones in classrooms throughout campus,

and instructors may allow participation in class via Zoom for those students in COVID isolation or quarantine.

As we return to pre-COVID-19 class attendance policy, I do ask that instructors work to accommodate students by allowing the student to make up work when possible. As applicable, the course syllabus should note that remote access to courses, activities, materials, and assignments cannot be guaranteed, and the level of Zoom access for students in COVID isolation or quarantine should be explained.

In closing, please know that SDSU's COVID Response Team and the JacksRBack Task Force continue to meet regularly and are monitoring the health and safety situation of our university community. I urge you all to take some time to continue checking the JacksRBack website on a regular basis. If you have remaining questions, please contact the Office of Academic Affairs at 605-688-4173.