

GEOG-121: INTERMEDIATE GEOGRAPHIC INFORMATION SYSTEMS (GIS)

GIS Courses

Course

- GEOG-120: Introduction to Geographic Information Systems (GIS)
- GEOG-121: Intermediate Geographic Information Systems (GIS)

Effective Term

Fall 2023

CC Approval

3/17/2023

AS Approval

4/11/2023

BOT Approval

4/20/2023

COCI Approval

5/12/2023

SECTION A - Course Data Elements

CB04 Credit Status

Credit - Degree Applicable

Discipline

Minimum Qualifications	And/Or
Earth Science (Master's Degree)	Or
Geography (Master's Degree)	Or
Computer Information Systems (Any Degree and Professional Experience)	

Subject Code

GEOG - Geography

Course Number

121

Department

Geography (GEOG)

Division

Science and Engineering (SE)

Full Course Title

Intermediate Geographic Information Systems (GIS)

Short Title

Intermediate GIS

CB03 TOP Code

2206.10 - *Geographic Information Systems

CB08 Basic Skills Status

NBS - Not Basic Skills

CB09 SAM Code

D - Possibly Occupational

Rationale

To develop new GIS courses and develop a 12 unit Certificate of Achievement program to meet the skills needed in entry-level and advanced workforce as indicated by current Labor Market Data.

SECTION B - Course Description

Catalog Course Description

Intermediate Geographic Information Systems builds upon the knowledge and skills learned in GEOG-120. Students develop more advanced analysis skills in GIS software. Reinforces practical applications and geographic concepts and techniques related to a Geographic Information System (GIS), including geographic coordinate systems, raster data processing and management, spatial databases, geoprocessing, digitizing various types of spatial analysis. Students learn how to implement techniques through completion of practical exercises.

SECTION C - Conditions on Enrollment

Open Entry/Open Exit

No

Repeatability

Not Repeatable

Grading Options

Letter Grade or Pass/No Pass

Allow Audit

Yes

Requisites

Prerequisite(s)

Completion of GEOG-120 with a minimum grade of C.

Requisite Justification

Requisite Description

Course in a Sequence

Subject

GEOG

Course #

120

Level of Scrutiny

Content Review

Upon entering this course, students should be able to:

- 1) Describe the fundamental concepts and applications of Geographic Information Systems and how industry uses GIS.
- 2) Apply cartographic principles of scale, resolution, projection and data management to create maps and visualizations
- 3) Demonstrate proficiency in acquisition, analysis, and interpretation of spatial data for geospatial application.
- 4) Apply GIS principles to solve spatial issues in the context of data model, data structure, and analytical techniques.

SECTION D - Course Standards

Is this course variable unit?

No

Units

3.00000

Lecture Hours

36

Lab Hours

54

Outside of Class Hours

72

Total Contact Hours

90

Total Student Hours

162

Distance Education Approval**Is this course offered through Distance Education?**

Yes

Online Delivery Methods

DE Modalities	Permanent or Emergency Only?
Entirely Online	Permanent
Hybrid	Permanent

SECTION E - Course Content**Student Learning Outcomes**

Upon satisfactory completion of the course, students will be able to:	
1.	Prepare and analyze geographic data.
2.	Apply intermediate GIS techniques for raster and vector-based analyses.
3.	Determine an appropriate approach to solving a spatial problem.
4.	Demonstrate proficiency in using geospatial tools and methods.
5.	Prepare and present geographic results using appropriate terminology and cartographic formats.

Course Objectives

Upon satisfactory completion of the course, students will be able to:	
1.	Demonstrate an understanding of the structure and organization of the current software package through hands-on application.
2.	Define and apply the relationship of geographic features and attribute data.
3.	Create a map project using GIS software.
4.	Perform feature identification and classification.
5.	Perform query and analysis functions.
6.	Integrate GIS with other software and technology.
7.	Define and edit spatial relationships.
8.	Demonstrate problem-solving applications of GIS through completion of a project.
9.	Utilize basic cartographic principles in map design and construction.
10.	Assess data variability, look for anomalies, examine global trends, and investigate spatial autocorrelation and the correlation between data sets.
11.	Apply GIS techniques and skills in various applications, such as environmental impact assessment, regional-city planning, contributing to disaster relief and public safety efforts, or exploring sociopolitical and humanitarian issues.

Course Content

1. Beyond basic GIS: Application of intermediate techniques
 - a. Raster GIS vs Vector GIS
 - b. Network analysis
 - c. 3-D analysis

- d. Web GIS
- e. Programming in GIS
- 2. Project design
 - a. Building a geodatabase
 - b. Data import and data conversion
 - c. Creating and updating metadata
- 3. Model building in GIS
 - a. Need for models
 - b. Examples of models
 - c. Applications of model
- 4. Base maps
 - a. Digitizing and scanning
 - b. Cleaning and building topology
 - c. Managing map projection
- 5. Spatial information analysis
 - a. Address matching
 - b. Spatial query
 - c. Buffer and overlay analyses
 - d. Raster Analysis and Map Algebra

Laboratory Content

Utilize GIS software in laboratory activities to meet objectives of course content. Laboratory activities include, but are not limited to:

Plan, evaluate and execute an intermediate-level GIS project:

1. Identify a problem of a geospatial nature
2. Outline a strategy to solve the problem
3. Locate relevant data sources or collect primary data
4. Prepare geographic data using GIS techniques for raster and vector-based analyses
5. Incorporate data sources into a Geographic Information System and execute strategy to solve a geospatial problem
6. Apply principles of spatial analysis and geospatial tools and methods
7. Prepare and present geographic results using appropriate terminology and cartographic formats

Methods of Instruction

Methods of Instruction

Types	Examples of learning activities
Activity	Create a professional geo-tourism map for a state (or country) of student's choosing.
Lecture	Computer enhanced lectures covering topics in course content.
Lab	Using current GIS software, determine the population at risk, within specified areas, in the event major natural gas pipelines should rupture in an earthquake.
Other	Use GIS methods to subtract the isostatic rebound from a digital elevation model (DEM) in order to create a map of the shoreline of Glacial Lake Hitchcock.

Instructor-Initiated Online Contact Types

Announcements/Bulletin Boards
 Discussion Boards
 E-mail Communication
 Video or Teleconferencing

Student-Initiated Online Contact Types

Discussions
 Group Work

Course design is accessible

Yes

Methods of Evaluation

Methods of Evaluation

Types	Examples of classroom assessments
Projects	Course final project in which students evaluate a problem that can be solved with intermediate/advanced GIS techniques. They will access the appropriate data, post-process and analyze it, and present the results to the class. Examples: 1) Use long-term temperatures and rainfall data for California to predict the possible effect of drought and flooding potential for years 2030 and 2035. 2) Use historical fire burn and landslide data to estimate high-risk areas of potential future debris flows.
Quizzes	Quizzes may be given throughout the course. Example questions: 1) Give 2 ways to access geoprocessing tools. 2) What are raster functions?
Portfolios	Develop an end of course GIS portfolio to be presented to peers in a simulated work environment.
Skills Demonstration	Weekly activities using current GIS software to build a final project and/or portfolio.

Assignments

Reading Assignments

Reading professional publications, internet research, and class handouts provided by the instructor. Examples:

- 1) Excerpts from professional publications such as "Using ArcGIS 3D Analyst"; researching the ESRI internet site and assessing the documentation.
- 2) assigned topics such as "Managing 3D data."

Writing Assignments

Each weekly assignment will have individual or collaborative research problems that will initiate compiling of data from a variety of sources and then performing GIS analysis to solve a problem presented for study. Examples:

- 1) The student might be asked to develop travel time solutions for a new housing development within a major city. This travel time solution would be used in the development of an Environmental Impact Report (EIR).
- 2) Develop a report identifying future potential landslide risk areas for the next 5 years in Napa County. The student would be asked to create a surface model showing temporal changes in demographic, business or environmental scanning variables.

Other Assignments

The instructor may assign a research paper. Example:

As a team of researchers, the students will present a research question that utilizes raster data developed from internet research to convert it to a 3D georeference image.

SECTION F - Textbooks and Instructional Materials

Material Type

Textbook

Author

Price, M.

Title

Mastering ArcGIS

Edition/Version

7th

Publisher

McGraw-Hill Education

Year

2019

ISBN

9780078095146

Proposed General Education/Transfer Agreement

Do you wish to propose this course for a Local General Education Area?

No

Do you wish to propose this course for a CSU General Education Area?

No

Do you wish to propose this course for a UC Transferable Course Agreement (UC-TCA)?

Yes

Do you wish to propose this course for an IGETC General Education Area?

No

Course Codes (Admin Only)

CB10 Cooperative Work Experience Status

N - Is Not Part of a Cooperative Work Experience Education Program

CB11 Course Classification Status

Y - Credit Course

CB13 Special Class Status

N - The Course is Not an Approved Special Class

CB23 Funding Agency Category

Y - Not Applicable (Funding Not Used)

CB24 Program Course Status

Program Applicable

Allow Pass/No Pass

Yes

Only Pass/No Pass

No

Faculty Author's Comments

This course proposal has been reviewed by a committee comprised of California GIS professionals.

Reviewer Comments

Seth Anderson (sethe.anderson) (Mon, 05 Dec 2022 20:00:30 GMT): Added Earth Science, Geography, and Computer Information Systems to discipline field. -Seth Anderson

Stacey Howard (showard) (Tue, 06 Dec 2022 04:56:05 GMT): Articulation Officer comments/questions: -Faculty intent to only allow letter grade as opposed to letter grade or pass/no pass option? -Remove partial sentence from course description (last line) -Needs to separate lecture content from lab content with headers distinguishing lecture from lab -Aligns to C-ID GEOG 155 (<https://www.c-id.net/descriptors/final/show/203>) -- plan to submit -Submit for C-ID GEOG 155 (Introduction to Geographic Information Systems and Techniques, with Lab) -Submit for UC transferability (pending CSU/UC Fa '23 per faculty request)

Stacey Howard (showard) (Wed, 07 Dec 2022 05:22:04 GMT): Articulation Officer: GEOG 120 is appropriate for UC-TCA but this course is not offered at UC, as an Intern Level. No C-ID exists.

Stacey Howard (showard) (Fri, 09 Dec 2022 04:42:52 GMT): Rollback: Confirm letter grade only option. Separate lecture from lab content for C-ID and UC-TCA submissions. Course description edit (last line?).

Seth Anderson (sethe.anderson) (Tue, 14 Feb 2023 18:17:36 GMT): Rollback: Under the Course Content field, please add headers to clearly distinguish between the lecture content of the course and the lab content. This is something external reviewers will be looking for in the COR.

Seth Anderson (sethe.anderson) (Wed, 01 Mar 2023 16:47:09 GMT): Rollback: Please add separate lab content under Course Content field (for UC articulation)