



GIS-583: SPATIAL DATABASE DESIGN AND MANAGEMENT (FORMERLY GEOG-583)

Effective Term

Fall 2025

BOT Approval Date

03/20/2025

Discipline

GIS - Geospatial Information Science

Course Number

583

Course Title

Spatial Database Design and Management (formerly GEOG-583)

Short Title

GIS Database Design

Credit Status (CB 04)

D - Credit - Degree applicable

Units

Lecture Units

3.00

Total Units

3.00

Hours

Lecture Contact Hours

48-54

Out of Class Hours Lecture

96-108

Total Contact Hours

48 - 54

Total Out of Class Hours

96 - 108

Total Student Learning Hours

144 - 162

Distance Education

Yes

Distance Education

Distance Education Type

Both Fully Online and Hybrid Online

Fully Online Delivery Requirements:

a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course



b. Any planned face-to-face meetings, such as an orientation or study session, must be optional

c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods:

- Orientation - Students must be oriented to the online and face-to-face portions at the start of the course.
- Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc.
- Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction.
- MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students.
- Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS.
- Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Catalog Description

This course prepares students with geographic concepts and skills necessary for GIS spatial database design and management. Students learn about various GIS data types and formats that are compatible or may be converted, exported or imported. Students design and create spatial databases for a specific application involving project management and complex data analysis. Real world challenges of spatial databases used for solving problems, spatial query language, decision support strategies and system integration are emphasized. (formerly GEOG-583)

Codes

TOP Code (CB 03)

2206.10* - *Geographic Information Systems

CIP Code

45.0702 - Geographic Information Science and Cartography.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Biological Sciences (Masters Required)	Or
Ecology	Or
Environmental Technologies	Or
Geography (Masters Required)	Or
Computer Science (Masters Required)	Or
Earth Science (Masters Required)	End

Learning Objectives

Learning Objectives

Learning Objective

1. Acquire and integrate data from a variety of sources to create, update and maintain GIS databases.
2. Discriminate between uses of nonspatial and spatial data models, specifically the relational data model and its extensions.
3. Import, create or modify data from other software programs and identify the strengths and weaknesses of database programs available to GIS.
4. Appraise steps necessary to implement a database, the importance of designing a spatial database and design a spatial database using various GIS software applications.
5. Design a spatial database from existing data and submit queries that generate new information necessary for a project outcome.
6. Prepare a spatial database for a specific project and maintain, upgrade and manage the spatial database within that environment.
7. Embrace opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal concerns represented the geographic distribution of human populations.
8. Evaluate relationships of geospatial data bases related to the diversity, socio-economic status, gender, ethnic-racial background and other aspects of the geospatial distribution of human populations particularly as they relate to underrepresented populations.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome

1. Students will develop and critique a well-thought-out process about what data the geodatabase will house.
2. Students will design a geodatabase is to model the reality it is intended to represent.
3. Students will evaluate examples of database feature types, a possible domain for each type, and possible subtypes for each type.
4. Students will assess why it is important to fully understand a system to be represented and managed in GIS.
5. Students will develop and analyse best practices for creating and maintaining data integrity in GIS data bases.

Content

Course Lecture Content

1. Designing Geodatabase Schema
 - A. Importance of Creating Geodatabase
 - B. Societal concerns represented the geographic distribution of humans especially as encountered in business and government situations.
 - C. Exploring a variety of different cultural, ethnic, racial, gender, sexual orientation and other factors contributing to inclusion of individuals in geographic database information. ~~database information~~.
 - D. Developing Blueprint Specifics – Project management
 - E. Spatial Database Environment
 - F. Data Types
3. Creating Geodatabase
 - A. Creating the data in Geodatabase
 - B. Importing the data form other sources to Geodatabase
 - C. Converting other data types to feature classes and make them compatible
- 4.. Populating and Sharing Geodatabase
 - A. Adding and Loading data to Geodatabase
 - B. Exporting the data to other sources
 - C. Exporting the data and converting to other formats
5. Extending Data Formats
 - A. Data management and standardizing
 - B. Coordinate Systems and Spatial References
 - C. Rasters

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6. Working with Features
 - A. Annotation Feature Class
 - B. Dimension Feature Class
 - C. Geometric Network
 - D. Relationships
 - E. Address Locators
 7. Advanced Editing
 8. Modeling
 - A. Creating models
 - B. Relationships
 9. Working with Topology
 - A. Topology
 10. Managing Geodatabase
 - A. Versioning
 - B. Replicas
 - C. Deleting Geodatabase
 - D. Archiving
 - E. Metadata
 - F. Sharing Geodatabase

Methods of Instruction

Method

Discussion

Integration

Discussions focusing on spatial database methods and techniques, best practices for applying spatial database techniques in GIS, and spatial database management in a variety of real-world scenarios. Discussions include but are not limited to exploring a variety of different cultural, ethnic, racial, gender, sexual orientation and other factors contributing to inclusion of individuals in geographic database information.

DE Adaptations for MOI

Students will participate in discussions, using the the course management system (CMS) and/or through teleconferencing. Discussion focus on spatial database design, maintenance, updates and management issues. Instructions for assignments will meet accessibility requirements.

Method

Homework

Integration

Homework includes practical applications that prepare students with sequential steps necessary for building a spatial database that can be queried for specific outcomes, and provide real-world experience with specific spatial database scenarios. Practical applications prepare students with necessary steps for building a spatial database that can be queried for specific outcomes, and provide real-world experience with specific spatial database scenarios and outcomes.

DE Adaptations for MOI

Students access the homework assignment using the course management system (CMS). Homework assignments are submitted for evaluation within the course management system. Instructions for homework assignments will meet accessibility requirements.

Method

Lecture

Integration

Lecture presentation and demonstration are used to demonstrate spatial database concepts, methods and applications, and include examination of other database management systems for strengths and weaknesses.

DE Adaptations for MOI

Students access lectures, asynchronously within the course management system (CMS). All lecture formats meet accessibility requirements.

Method

Projects

Integration

Projects require students to work in management teams and to design and present spatial database projects designed for specific applications, with a timeline for upgrades, maintenance and improvements. These database projects are designed to represent presentations in a professional workplace environment. Projects include the evaluation of societal concerns of the diversity of peoples represented by the geographic distribution of humans especially as encountered in business and government situations.

DE Adaptations for MOI

Students are assigned to management teams within the course management system (CMS). Project design and implementation is described within the CMS. Projects are submitted as slide presentations and/or embedded video links for discussion and critique by students and the instructor. Projects and instructions for project assignments meet accessibility requirements.

Method

Film/video Viewing and Discussion

Integration

Software vendor video demonstrations and webinars focus on spatial database design and management supplement lectures and reinforce student comprehension of lecture content.

DE Adaptations for MOI

All video demonstrations and webinars meet accessibility standards and are provided within the course management system (CMS).

Methods of Evaluation**Method**

Class Participation

Integration

Participation in discussions on spatial database, design, concepts, management and implementation is graded based on critical thinking, relevance and added value.

DE Adaptations for MOE

Students participate in discussions within the course management system. Participation is graded with an assessment rubric defined within the CMS. Evaluation is submitted privately to individual students within the course management system. Instructions for class participation assignments will meet accessibility requirements.

Method

Exams/Tests

Integration

Tests use a variety of question formats to assess student understanding of GIS terms and concepts, spatial database methods, applications, design and management issues as presented in lectures, assigned readings and practical applications.



DE Adaptations for MOE

Students participate in examinations, tests and quizzes within the course management system. Instructions for examinations will meet accessibility requirements. Participation is graded with an assessment rubric defined within the CMS. Evaluation is submitted privately to individual students within the course management system. Students receive assessment and other timely feedback from the instructor via rubric and grading tools in the CMS.

Method

Group Projects

Integration

Students are graded individually, and as part of their group, for performance on a management team preparing a spatial database for a specific outcome, then promoting, demonstrating and presenting it to the class.

DE Adaptations for MOE

Students are assigned to and participate in group projects within the course management system. Participation in group projects is graded with an assessment rubric defined within the CMS. Students are evaluated both as individuals and as part of a group for their performance as part of a management team. Group projects are presented to the class as slide presentations, embedded video link or in other asynchronous presentation formats for discussion by students and faculty in the course management system. Instructions for group project assignments will meet accessibility requirements. Students receive assessment and other timely feedback from the instructor via rubric and grading tools in the CMS.

Method

Homework

Integration

Homework provides practical applications to assess the student's ability to integrate geospatial concepts from lecture presentation and demonstration, and are graded for performance and comprehension of spatial database concepts, design and implementation. Certificates of completion for software vendor applications are graded as pass/no pass.

DE Adaptations for MOE

Students access homework assignments using the course management system. Homework assignments are submitted for grading and evaluation within the course management system. Students receive individual feedback and grading of assignments within the course management system. Instructions for homework assignments meet accessibility requirements. Students receive assessment and other timely feedback from the instructor via rubric and grading tools in the CMS.

Method

Class Participation

Integration

Explore a variety of different cultural, ethnic, racial, gender, sexual orientation and other factors contributing to inclusion of individuals in geographic database information. database information.

DE Adaptations for MOE

Students participate in discussion sessions within the course management system. Discussions are submitted within the CMS and will meet accessibility requirements. Participation is graded with an assessment rubric defined within the CMS. Evaluation is submitted privately to individual students within the course management system. Students receive assessment and other timely feedback from the instructor via rubric and grading tools in the CMS.

Assignments

Assignment Type

Writing



In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Import and create data by using geoprocessing tools, UML diagram, schemas, case tools, and modeling methods in a GIS application. The assignment should include a preplan of the logical organization of the spatial database, create the spatial database and processing methods for the desired outcome. Submit an approximately 1000 word report describing the database design and plans for management; include a UML diagram with your report. The assignment should include a search for non-spatial data that may be represented by schemas for a spatial database model. Write a summary of how you will design a spatial database from those data. The model must include spatial information source, subtypes, domain, multiple testing of the spatial database and a summary of life cycle, as it applies to your proposed project for this class. Implement your model and submit it as a processual flow chart.

How assignment will be adapted in online format

The assignment is developed and submitted, asynchronously within the course management system (CMS). Data base research may be done using DEI resources such as internet and other on-line asynchronous information sites. Writing assignments are submitted for grading and evaluation within the course management system. Students receive individual feedback and grading of assignments asynchronously within the course management system. Instructions for writing assignments will meet accessibility requirements.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Identify and evaluate information needed to construct and maintain a spatially enabled relational database. Research and assignment construction may be conducted using library or internet resources. Be prepared to discuss your finding in class.

How assignment will be adapted in online format

The evaluation of information needed to construct and maintain a spatially enabled relational database will be carried out asynchronously. Students may be required to submit a summary of the reading assignments in the course management system (CMS) in leu of a classroom discussion. The assignment will be constructed and submitted in the course management system. Evaluation and grading will use a rubric specifically designed for the assignment. Individual students will receive evaluation and grading of assignments within the course management system. Instructions for reading assignments will meet accessibility requirements.

Assignment Type

Reading

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

Evaluate and summarize some of the fundamental concepts and management of geospatial enterprise databases contextualized with a focus upon GIS project management best practices. This shall include researching the valuation and summarization of some of the fundamental concepts and management of geospatial enterprise databases contextualized with a focus upon GIS project management best practices. Readings shall include diverse societal concerns represented the geographic distribution of humans of various, racial, ethic, age and gender populations especially as encountered in business and government situations. Readings may be conducted using library or using other local or internet resources.

How assignment will be adapted in online format

Research will be carried out using internet or other local resources. The assignment will be developed, submitted and graded asynchronously using the course management system (CMS). Assessment and grading will use the appropriate course management system functions. Individual students will receive evaluation and grading feedback within the course management system. Instructions for reading assignments will meet accessibility requirements.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Review and evaluate how geographic features are represented in a geodatabase for various thematic data sets (for example, as points, lines, polygons, or rasters) along with their tabular attributes and how the data are organized into datasets, such as feature classes, attributes, raster and datasets. Written assignments shall include an exploration of a variety of different cultural, ethnic, racial, gender, sexual orientation and other factors contributing to inclusion of individuals in geographic database information.

How assignment will be adapted in online format

The assignment will be researched, developed and submitted using the course management system and other on-line resources as necessary. Students may use local or internet resources. Assessment and grading will use the appropriate course management system functions. Students will receive individual feedback, evaluation and grading asynchronously within the course management system. Instructions for writing assignments will meet accessibility requirements.

Assignment Type

Writing

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Formative

Assignment

Develop a preliminary design for a GIS data base which evaluates not only the geophysical aspects of geospatial distribution; but as well, the socio-cultural perspectives of human populations, as they pertain to race, gender identity, sexual orientation, and cultural differences particularly as they relate to historically underrepresented populations.

How assignment will be adapted in online format

The assignment will be researched, developed and submitted using the course management system and other on-line resources as necessary. Students may use local or internet resources. Assessment and grading will use the appropriate course management system functions. Students will receive individual feedback, evaluation and grading asynchronously within the course management system. Instructions for writing assignments will meet accessibility requirements.

Assignment Type

Reading

In-class and/or outside of class

In-class

Outside of class



Formative or Summative

Summative

Assignment

Develop a literature search bibliography of geospatial databases which emphasize how the discipline of Geospatial Science offers opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal concerns represented in the geographic distribution of humans. Students will be encouraged to explore these concerns particularly as they relate to historically underrepresented populations of various human diversity including but not limited to racial, ethnic, cultural, gender identification, and age. The bibliography will be presented and discussed in class and submitted to the instructor.

How assignment will be adapted in online format

The literature search and bibliography development will be carried out asynchronously. Students submit the literature search bibliography in the course management system in lieu of a classroom discussion. The literature search may use local as well as internet information. Evaluation and grading will use a rubric specifically designed for the assignment. Individual students will receive evaluation and grading of assignments within the course management system. Instructions for the development of the literature and bibliography will meet accessibility requirements.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

Read and summarize the scholarly article, "Spatial analysis and GIS in the study of COVID-19. A review". This article is available in digital format at, <https://www.sciencedirect.com/science/article/pii/S0048969720335531>.

How assignment will be adapted in online format

The reading assignment and specific article will be presented in the CMS. Students submit a summary of the article in the CMS. A student/instructor discussion session will be available in the CMS. Evaluation and grading will use a rubric specifically designed for the assignment. Individual students will receive evaluation and grading of assignments within the course management system. Instructions for the development of the reading summary and the discussion session will meet accessibility requirements.

Course Materials**Textbooks**

Allen, David W. (2019) Focus on Geodatabases in ArcPro. ESRI Press. ISBN9781589484450
Most recent text.

Other Resources

Create a file Geodatabase (2023). <https://pro.arcgis.com/en/pro-app/latest/help/data/geodatabases/manage-file-gdb/create-file-geodatabase.htm>

Open Educational Resources

Geodatabase workbook, by ESRI. Format .pdf
<http://www.ciesin.columbia.edu/gisservicecenter/pdf/GeodatabaseWorkbook.pdf>

Class Size Information**Class Size**

40

Class Size Category

A - Lecture/discussion 40

Diversity and Inclusion

Course Design and Materials: Course will incorporate diverse perspectives, authors, and examples that reflect a variety of cultures, identities, and lived experiences. Instructional materials will be reviewed regularly to ensure representation, inclusivity, and alignment with equity-minded practices across disciplines.

Inclusive Learning Environment: Instructors will establish classroom norms and policies that promote respect, civil discourse, and belonging in both online and face-to-face classes. Clear expectations for communication and engagement will support a learning space where all students feel valued and heard.

Accessible Instruction: Course content will be delivered using accessible design. Materials will follow accessibility guidelines within the CMS, including captioned media, readable document formats, and multiple means of engagement to support diverse learning.

Equitable Teaching Practices: Instructors will use transparent and grading criteria, varied assessment methods, and timely feedback to promote fairness and student success. Opportunities for revision, reflection, and multiple demonstrations of learning may be incorporated when appropriate to the discipline.

Culturally Responsive Pedagogies: Instructional strategies will encourage critical thinking about diverse perspectives and systems of power relevant to the course content. Faculty will foster opportunities for students to connect course material to real-world contexts.

Ongoing Reflection and Improvement: Faculty will engage in continuous professional development related to IDEAA principles and reflect on course practices using metacognition to identify opportunities for increased equity, inclusion, and accessibility.

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

Emphasis is placed on the articulation of how contributions to the discipline of Geospatial Science offer student's opportunities to foster empathy, expose variant interpretations, and exhibit diverse concerns represented the geographic distribution of humans. Diversity issues are interspersed throughout the course content and are emphasized in instruction and assignments as well as the methods of evaluation. Lecture presentations and discussions explore a variety of different cultural, ethnic, racial, gender, sexual orientation and other factors contributing to inclusion of individuals in geographic database information are designed to help students evaluate GIS materials and course content. Student projects include the evaluation of societal concerns of the diversity of peoples represented by the geographic distribution of humans especially as encountered in business and government situations.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

Students are encourage to evaluate the instructional materials and course content from the perspective of their own personal experiences and learning styles. Discussions are designed to allow students to contextualize the course content in relationship to their own learning and to experience the materials from the point of view of other members of the learning community. Methods of instruction in delivering course content as well as in the assignments and evaluation of assignments are designed to help individual students contextualize the information within their own frameworks.

Interactions**Explain how the course will incorporate student-to-student interaction.**

Students are encouraged to work together to solve geospatial problems related to specific situations that occur in the commercial use of geographical related data in a variety of entities. Students evaluate and navigate the ambiguity of a variety of different cultural, ethnic, racial, gender, sexual orientation and other factors contributing to a variety of situation presented in a geospatial representation of human data used in a variety of social services, business and government applications. Student work groups summarize various readings, and pertinent applicable GIS information. Work groups present a variety of databases to the class and lead discussions as to how these kinds of databases might be used in a variety of GIS applications.

Explain how the course will incorporate instructor-to-student interaction.

The instructor will have instructor to student interactions not only in lecture but in facilitating quest lecturer presentations as well. The instructor develops and encourages instructor to student interactions during regularly scheduled class time. Lecture instruction is designed to include group as well as intensive instructor student one-on-one instruction in the use of the ArcGIS professional software. The instructor works with individual students as well as small groups to give intensive instructor student one-on-one instruction in the use of the databases for evaluating geospatial information. To better support a diverse range of learners, instructors are encouraged to incorporate formative and summative active learning strategies.

Explain how the course will incorporate student-to-content interaction.

Student to content interaction is incorporated in the lecture and software application presentations and assignments as well as weekly formative project and a Capstone semester project. Student to content interaction take place in traditional synchronous educational settings as well as in other DE modalities. Students review and summarize various database articles to contextualize geodatabase schema and geodatabase referenced socio-economic, environmental and geographic topological information into their own learning. As this information is constantly changing students are given tools to create, populate, modify and share pertinent geodatabases which represent the most current and complete information representing the factors that influence the distribution of human populations. These interactions take place in the classroom environment as well as within the CMS presented in the on-line environment.

Explain how the course will incorporate student-to-self interaction (metacognitive).

The goal is to support students in connecting their experiences with databases and database management terms and concepts presented in the course; and to validate the student's life experience by seeing themselves in the material and assignment requirements particularly as it relates to careers in GIS applications in social services, commercial, business and government entities. Student reading, writing, and group project assignments are designed to help contextualize this information into their own learning experiences and life interactions. With the goal of developing the skills necessary to have a successful career in the geospatial information science industry.

Key: 1689