



GIS-525: ADVANCED GEOGRAPHIC INFORMATION SCIENCE (FORMERLY GEOG-525)

Effective Term

Fall 2024

BOT Approval Date

12/14/2023

Discipline

GIS - Geospatial Information Science

Course Number

525

Course Title

Advanced Geographic Information Science (formerly GEOG-525)

Short Title

Advanced GIS

Credit Status (CB 04)

D - Credit - Degree applicable

Units

Lecture Units

2.00

Lab Units

1.00

Total Units

3.00

Hours

Lecture Contact Hours

32-36

Out of Class Hours Lecture

64-72

Lab Contact Hours

48-54

Out of Class Hours Lab

0.00

Total Contact Hours

80 - 90

Total Out of Class Hours

64 - 72

Total Student Learning Hours

144 - 162

Is this an existing Extensive Lab?

Yes



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 for advanced geographic analysis. Spatial statistics, topology and surface modeling are emphasized. Advanced tools, techniques and software applications for modeling surfaces, such as spatial, network and 3-dimensional terrain analysis are explored. Both qualitative and quantitative techniques for spatial analysis are explored in the context of various scientific methodologies. (formerly GEOG-525)

Attach Supporting Documents

Addendum 3A LABOR MARKET CENTERS of EXCELLENCE Geographic_Information_Systems_GIS_1.docx

Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)

GIS-520 (with a grade of C or better).

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

Learning Objectives

Learning Objectives

Learning Objective

1. Assess current state of geospatial science and technologies given most recent software advancements.
2. Prepare a meaningful GIS model that demonstrates a range of technical methods and scientific knowledge.
3. Determine appropriate projection and coordinate system, appraise data quality control and implement quality assurance.
4. Design workflows that identify the sequence of procedures involved in exploring, acquiring and gathering data, organizing and analyzing data, and iterative steps taken and reconsidered for processing data for a specific project.
5. Select appropriate advanced spatial and statistical analysis for a geospatial model.
6. Demonstrate familiarity with codes of professional ethics and rules of conduct for geospatial professionals.
7. Recognize allied disciplines that rely on geospatial technology and their discipline specific geospatial theories and models.
8. Prepare a professional map showcasing student ability to manipulate visual display and aesthetics.
9. Prepare and deliver a professional GIS presentation for a specific audience.
10. Evaluate relationships of geospatial organization related to diversity, socio-economic status, gender, ethnic-racial background and other aspects of the geospatial distribution of human populations.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome

1. Students will develop the ability to design a GIS model, research, gather, import and convert data and apply appropriate software and analytical methods.
2. Students will develop the ability to prepare a professional presentation and communicate the outcome with an audience of your peers.
3. Students will demonstrate an understanding of a GIS Professional position by preparing a professional resume, letter of introduction and portfolio of map products for job marketing.
4. Students will demonstrate an understanding of the scientific method for evaluating, critiquing or identifying steps necessary to solve a spatial problem.
5. Students will discuss a complex GIS method or application using terminology and concepts common to the field.
6. Students will exercise reflective thought in considering geospatial information and data as it pertains to the distribution, equity and diversity of human populations.

Program Learning Outcomes

Learning Outcome

- Integrate spatial thinking with applied technology to analyze physical and cultural patterns, and discuss trends and relationships.
- Explore spatial relationships at different scales from local, regional to global.
- Explain the interrelationship between humans and the physical environment.
- Apply the scientific method to objective and subjective analysis of cultural and physical environments.
- Appreciate different cultural and ethnic perspectives within the context of opportunities and challenges.

Institutional Learning Outcomes

Aesthetic Awareness: The student will identify and evaluate how aesthetic expression leads to an appreciation of social and cultural context as well as the values of art and nature.

Communication: The student will effectively express and exchange ideas through listening, speaking, reading, writing, visual works, and other modes of interpersonal expression.

Critical Thinking: The student will analyze problems, gather and synthesize relevant information, evaluate ideas, information, and evaluate alternative points of view to create, innovate and implement effective solutions.

Cultural Awareness and Humility: The student will demonstrate knowledge of and sensitivity toward individuals of diverse ethnicity, age, gender, sexual orientation, and religious affiliations, as well as toward those individuals with diverse abilities and socio-economic classes to respectfully interact with individuals of diverse perspectives, beliefs and values while being mindful of the limitation of their own cultural frameworks.

Information and Technology Literacy: The student will access, interpret, evaluate, and apply relevant information sources and digital media effectively, and in an ethical and legal manner.

Scientific Awareness: The student will apply the scientific method of inquiry to assess potential solutions for real-life challenges by employing science-based knowledge and methodologies in daily life.

Social Awareness: The student will recognize and analyze the interconnectedness of global, national, and local concerns, analyzing cultural, political, social, and environmental issues from multiple perspectives and appreciate similarities and differences among cultures.

**Personal
and Professional Responsibility
Civic**

Content

Course Lecture Content

I. Use of Geospatial Information in Decision Making

A. Model versus Real world

1. Who, Where, Why - Exploring the Spatial Organization of Populations
2. Scientific and Ethical Considerations of Geospatial
3. Distribution of Human Population
 - a) Socio-economic Influences
 - b) Ethnic and Racial Considerations
 - c) Gender aspects of Geospatial Information
 - d) Diversity represented in Human Geospatial Distribution. The

and Communities Around the World
Distribution

questions human organization.

"why" associated with the "Who" and "Where"

B. Advantages and Problems with Models

C. Applications of GIS and decision making

II. Field data collection

A. Fitness/Bell Shape Curve

B. Mean and Standard Deviation

III. Sampling strategies

A. Systematic

B. Random

C. Stratified

D. Combinations of strategies

1. Racial and ethnic aspects of human populations

2. Gender aspects in human spatial distributions

IV. Advanced GIS Analysis

A. Geographic features

B. Geographic attributes

V. Geographic Patterns and Relationships

A. Mapping where things exist

1. Mapping aspects of human diversity

2. Isolation of human populations as it affects racial distribution

B. Deciding what to map

C. Preparing data

D. Analyzing geographic patterns

VI. Calculating the most and least

A. Understanding quantities

-
- B. Creating classes
 - C. Looking for patterns
 - 1. Human diversity influences
 - 2. Cultural imperatives
 - 3. Socio/Economic considerations
 - VII. Mapping density
 - A. Various ways to map density
 - B. Defined areas
 - C. Density surface
 - VIII. Overlay analysis
 - A. Methods for finding what's inside
 - B. Areas and features
 - C. Selecting features inside an area
 - D. Overlaying areas and features
 - IX. Neighborhood Analysis
 - A. Finding what's nearby
 - 1. Defining human neighborhoods by gender, ethnicity, cultural, socio/economic factors
 - 2. Proximity factors which influence diverse human population distribution
 - B. Straight-line distance
 - C. Cost over a network
 - D. Calculating cost over a geographic surface
 - X. Mapping change
 - A. Types of change analysis
 - B. Creating a time series
 - C. Creating a tracking map
 - D. Measuring change
 - XI. Geoprocessing
 - A. Queries to extract features
 - B. Clipping features
 - C. Dissolving features
 - D. Merging features
 - E. Intersect layers
 - F. Union layers
 - G. Automated processes
 - XII. Testing statistical significance
 - A. Statistics to identify patterns
 - B. Pattern in feature locations
 - C. Spatial pattern of feature values
 - D. Spatial neighborhoods and weights
 - E. Spatial autocorrelation
 - F. Identifying Clusters
 - XIII. Analyzing Geographic Relationships
 - A. Statistics to analyze geographic relationships
 - B. Identifying geographic relationships
 - C. Analyzing geographic processes
 - XIV. Spatial Analysis
 - A. Buffering
 - B. Site suitability analysis
 - C. Surface analysis

D. Surface Calculations

XV. 3D Analysis

A. Terrain Analysis

B. 3D Conversion

C. 3D rendering/extruding

XVI. Network Analysis and topology

XVII. Optimizing work flows

A. Model Builder

B. Scripts

Course Lab Content

I. Map Design

A. Choropleth maps

B. Group layers

C. Threshold scales

D. Custom attribute scales

E. Point maps

F. Definition query

G. Hyperlinks

II. GIS Outputs

A. Interactive GIS

B. Map Layouts

C. Custom map templates

D. Reports

E. Graphs

III. Multiple pages

A. Animation

IV. File geodatabases

A. Building

B. ArcCatalog utilities

C. Modify attribute table

D. Join tables

E. Centroids

F. Aggregate data

G. Spatial data

H. Metadata

I. Map projections

J. Vector data

K. Process tabular data

L. Raster data sources

M. Digitizing

N. Polygon features

O. Advanced editing

P. Point features

Q. Line features

R. Spatially adjust features

V. Geocoding

A. Zip Codes

B. Street addresses

C. Interactive rematch

- D. Street reference
- E. Alias table
- VI. Geoprocessing
 - A. Extract features
 - B. Clip features
 - C. Dissolve features
 - D. Merge features
 - E. Intersect layers
 - F. Union layers
 - G. Model Builder
- VII. Spatial Analysis
 - A. Buffering
 - B. Site suitability
 - C. Noncoterminous polygons
- VIII. 3D Modeling
 - A. Scenes
 - B. TINs
 - C. Draping
 - D. Navigating
 - E. Fly-through animation
 - F. Effects and symbols
 - G. Line of sight
 - H. ArcGlobe
- IX. Spatial Analyst
 - A. Process raster layers
 - B. Hillshade
 - C. Kernel density
 - D. Raster values
 - E. Site suitability
 - F. Risk index
- X. Mapping Categories
 - A. Controlling values
 - B. Limiting values
- XI. Mapping Quantities
 - A. Choosing classes
 - B. Map series
 - C. Charts
- XII. Overlaying datasets
 - A. Finding what's inside
 - B. Finding what's partially inside
- XIII. Nearby feature analysis
 - A. Selecting nearby features
 - B. Buffer features
 - C. Clipping features
 - D. Buffer values
 - E. Multiple buffer zones
 - F. Quantifying nearness
 - G. Creating distance surfaces
 - H. Calculating cost

- I. Calculating nearness
- XIV. Mapping change
 - A. Location and magnitude
 - B. Percent change
- XV. Geographic distribution
 - A. Calculating centers
 - B. Adding weights
 - C. Calculating standard distance
 - D. Calculating standard deviational ellipse
 - E. Calculating linear directional mean
- XVI. Pattern Analysis
 - A. Average nearest neighbor
 - B. Cluster values
 - C. Multi-distance clustering
 - D. Spatial autocorrelation
 - E. Cluster and outliers
 - F. Hot-spot analysis
- XVII. Error measurement
 - A. Root mean square error (RMSE)
 - B. Error detection and propagation
 - C. Geostatistical Analyst error measurement

Methods of Instruction

Method

Lecture

Integration

Lecture on quantitative methods for statistical, surface and site analysis. Geospatial representations, data accuracy, sampling strategies and ethics of data acquisition are also covered. Lecture is designed to help students assess the current state of geospatial science and technologies given the most recent software advancements. Emphasis is placed on the articulation of how contributions to the discipline of Geospatial Science offer students opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal concerns represented by the geographic distribution of humans around the globe.

DE Adaptations for MOI

Lecture material may be delivered within the CMS via captioned video of instructor presentations or other accessible third party educational video lectures. It may also be presented using slide shows, written narratives or synchronous conferencing. Lectures will focus on quantitative methods for statistical, surface and site analysis. Geospatial representations, data accuracy, sampling strategies and ethics of data acquisition are also covered. This is directed at facilitating an understanding of spatial data and the software tools appropriate for facilitating their analysis. Students pose questions to the instructor both synchronously and asynchronously using video conference tools, email, and discussion forums. All maps presented are accompanied by accessible data files and alt text explanations.

Method

Discussion

Integration

Instructor monitored discussions that focus on applications, methods, problem-solving and decision support systems. An example discussion may require students to select appropriate advanced spatial and statistical analysis for a particular geospatial model and to provide student to student and student to instructor interaction in a discussion session. The goal is to support students in connecting their personal experiences with the terms and concepts presented in the course and to validate the student's life experience by seeing themselves in the material and assignment requirements.

DE Adaptations for MOI

Instructor monitored CMS discussions that focus on applications, methods, problem-solving and decision support systems. Discussions are designed to facilitate student to student and instructor to student interactions. The discussions may take place

asynchronously within the CMS or synchronously using accessible teleconferencing media or asynchronously using prerecorded, accessible, videos, podcasts or other digital media.

Method

Homework

Integration

Homework exercises emphasize data acquisition, database design, analysis, project development and quality assurance. Homework is designed to help students meet the course learning objectives giving students an opportunity to explore spatial relationships at different scales from local, regional to global. Homework is related to a variety of course and program learning objectives including giving students practice in demonstrating an understanding of the scientific method for evaluating, critiquing or identifying steps necessary to solve a spatial problem and exploring spatial relationships at different scales from local, regional to global. Homework topics where diverse populations are focused on include an investigation of a broad spectrum of societal factors influencing the socio-economics, gender, gender-identity, age, racial and ethnic distribution and abundance of human activity represented in various parts of the world.

DE Adaptations for MOI

Weekly accessible homework assignments consist of spatial exercises emphasizing topics related to the lecture material and are submitted using the CMS procedures for grading by the instructor. These may be a mix of formative and summative assessments and the focus is on mastery of sampling strategies, approaches to spatial analysis and the ethical considerations relevant to acquiring and using spatial data. These are graded objectively to determine if students have mastered key skills and methods necessary in producing a geospatial product or analysis. Students receive formal evaluation/grading of the assignments within the CMS grading system and in formal discussion sessions which include instructor-student and student-student feedback.

Method

Observation and Demonstration

Integration

Software demonstrations and observation of various discipline specific geospatial methods for scientific inquiry. Demonstrations are designed to provide a basis for students to meet course learning objectives such as being able to apply the scientific method to objective and subjective analysis of cultural and physical environments. The course uses geospatial case studies, observations and demonstrations reflecting diverse levels of learning experiences which allow students to see themselves at an appropriate level of interaction with the material. In addition, students are encouraged to practice new applications of geospatial analysis from diverse socio-cultural perspectives.

DE Adaptations for MOI

Students will observe prerecorded accessible software demonstrations of various discipline-specific geospatial methods for scientific inquiry in the online course management system. These demonstrations will guide students through advanced spatial and statistical analysis to meet course objectives. All maps presented will be accompanied by accessible data files and alt text explanations. Asynchronous discussion sessions within the CMS allow for instructor-student and student-student interactions guide students in their understanding of the specific methods and observations demonstrated.

Method

Projects

Integration

Student projects involve preparation and professional presentation of a real-world scenario project. This instructional method specifically represents one of the course learning outcomes of providing students with the knowledge and means to prepare a professional map showcasing student ability to manipulate visual display and aesthetics. Projects offer students opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal concerns represented by the geographic distribution of humans.

DE Adaptations for MOI

Projects are submitted using accessible CMS software. Students receive formal evaluation/grading of the projects within the CMS grading system. Projects are evaluated using a rubric specifically designed for each individual project. In addition formal, graded,

asynchronous (or synchronous when appropriate) discussion sessions are provided to allow for instructor-student and student-student evaluation and constructive feedback.

Methods of Evaluation

Method

Capstone Project

Integration

The Capstone Project is a real world scenario project that students work on throughout the class as a collaborative group, with each student focusing on a technique, application or method. The Capstone project specifically prepares students to meet the course learning objective of preparing a professional presentation and communicating the outcome with an audience of their peers. Students individually submit a document outlining their role on the project, including a flow chart that graphically displays their integral role. Throughout the course students work on a variety of other "presentation" projects which will be included in the semester "Capstone" project which represents the culmination of ArcGIS Pro applications and procedures for developing professional quality GIS projects. Emphasis of the projects is placed on how contributions to the discipline of Geospatial Science allow students opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal concerns represented by the geographic distribution of humans around the globe. The project is evaluated on the basis of a rubric which includes how thoroughly and accurately the project represents the use of GIS methods and information presented in the course. The rubric includes timelines for the project, appropriate use of applications and procedure, use of graphic presentations of data and use of appropriate ArcGIS Pro applications.

DE Adaptations for MOE

This collaborative group project is asynchronously monitored by the instructor in a formal graded, CMS discussion assignment. Individual student efforts are submitted in the CMS as a document that includes a flow chart outlining the individual's part in the group project. These individual projects are summative assessments, graded based on proper and efficient workflow implementation. Individual groups report their proceedings in the summative discussion sessions which provides the forum to bring together all aspects of the Capstone Project. The instructor monitors the discussion to make sure students are progressing appropriately to the completion of the final semester Capstone project and provides constructive suggestions where appropriate. Individual student and group work is submitted (up-loaded) within the CMS. The final Capstone Discussion session is designed to allow for instructor-student and student-student evaluation and critique of the completed Capstone project. The discussion may be conducted with accessible video conferencing technology, such as Zoom when appropriate for the course distance education format (hybrid and/or in-person real time). Details of individual student participation and group contributions are submitted with the CMS grading procedures. All presentations must meet accessibility standards. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Method

Class Participation

Integration

Participation in collaborative think tank discussions for preparing real world project. Using terminology and concepts common to the field, discussions include review and analysis of complex GIS methods and/or applications of ArcGIS Pro software. Class participation is specifically designed to help students meet the course learning objects such as developing the ability to design a GIS model, research, gather, import and convert data and apply appropriate software and analytical methods. Class participation allows students to explore various interpretations and understandings of their individual relationships in terms of the socio-economics, gender, gender-identity, age, racial and ethnic distribution in relationship to geospatial organization related to their own identity.

DE Adaptations for MOE

Student asynchronous participation in a CMS discussion forum or synchronous participation through accessible teleconferencing/live chat is monitored and graded by the instructor. Students' written critique of other students' presentations are submitted via the CMS and graded as class participation. Grading is based on the demonstrated synthesis of materials presented in the course and proper use of GIS methods to address problems. Individual participation assignments are submitted in the CMS grading procedures. The instructor evaluates student participation in each assignment and provides both a grade and constructive feedback. Evaluation and feedback is also given using graded Discussion assignments within the CMS. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Method

Homework

Integration

Homework exercises emphasize data acquisition, database design, analysis, project development and quality assurance. Homework assignments are designed to explore the geospatial constructs in relationship to equity and diversity and to provide opportunities where students can evaluate their own cultural experiences through the application of geospatial information science materials and methods. Evaluation of homework includes how the output represents a variety of data presentations, including mapping and data analysis of specific geospatially related questions; what resources are being explored; who (the diversity of populations) are impacted by the resources; where the resources are congregated and the historical data influencing the geospatial distributions.

DE Adaptations for MOE

Homework assignments are submitted online to the course management system for grading by the instructor. These will be graded objectively to determine if students have mastered key skills and methods necessary in producing a geospatial product or analysis. Weekly accessible homework assignments consist of spatial exercises emphasizing topics related to the lecture material and are submitted using the CMS procedures for grading by the instructor. These may be a mix of formative and summative assessments and focus on mastery of sampling strategies, approaches to spatial analysis and the ethical considerations relevant to acquiring and using spatial data. These will be graded objectively to determine if students have mastered key skills and methods necessary in producing a geospatial product or analysis. Students receive formal evaluation/grading of the assignments within the CMS grading system and in formal discussion sessions which include instructor-student and student-student feedback. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Method

Oral Presentation

Integration

Geospatial Information Science specializes in the application of geospatial technologies and analysis techniques to solve complex spatial problems and generate valuable insights. A major concern of GIS is the investigation of geospatial orientation of the diversity, equity, and inclusion of human populations. Oral presentations are designed to explore these aspects of GIS. Oral presentations by students are graded based on a rubric that assesses various levels of content, organization, audience identification, compelling message, visual aids and comprehension, such as good grammar skills. Presentations allow students to design and execute their learning experience, under the guidance of the instructor, to be associated with career fields and sub-disciplines that are of most interest to them. The goal of the oral presentation is to support students in connecting their experiences with the terms and concepts presented in the course and to validate the student's life experience by seeing themselves in the material and assignment requirements. The oral presentation encourages and allows students to explore various interpretations and understandings of their individual relationships to geospatial organization related to their own diversity, socio-economic status, gender, ethnic-racial background and other aspects of their own identity and history.

DE Adaptations for MOE

Oral presentations are submitted as accessible video media files, voice-over PowerPoint slide presentations, podcasts, or other approved audio/video documents into the CMS for listening and/or viewing by students and evaluation by the instructor. The Oral Presentation is submitted in a graded Discussion within the CMS designed to allow for instructor-student and student-student evaluation and critique of the presentation. The Discussion may be conducted with accessible video conferencing technology, such as Zoom or Google Meets, when appropriate for the course distance education format (hybrid and/or in-person real time). Evaluation details of individual student presentations, participation and contributions in the Discussion session are submitted with the CMS grading procedures. Individual Oral Presentations are also uploaded into the CMS grading system for instructor-student confidential evaluation and grading by the instructor. All presentations must meet accessibility standards. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Method

Class Work

Integration

Laboratory class work is required. Students are required to apply lecture content to laboratory assignments. Laboratory assignments require students to produce ArcGIS output using information discussed and developed in lecture. This output represents a variety of data presentations all of which include mapping and data analysis of specific geospatially related questions; what resources are being explored; who (the diversity of populations) are impacted by the resources; where the resources are congregated and the historical data influencing the geospatial distributions. Laboratory work is evaluated on the basis of rubrics designed for each specific laboratory assignment. Students are evaluated on how well they identify, apply and follow appropriate ArcGIS Pro applications; the accuracy of the data collected; and the appropriateness of the conclusions drawn from the exercise.

DE Adaptations for MOE

Laboratory class work is submitted as accessible documents into the CMS for evaluation by the instructor. Laboratory class work is submitted in a graded quiz or laboratory report format within the CMS designed to allow for instructor-student evaluation and critique of the laboratory assignment. Students are evaluated on how well they identify, apply and follow appropriate ArcGIS Pro applications; the accuracy of the data collected; and the appropriateness of the conclusions drawn from the exercise. Evaluation details of individual student work is done using an appropriate laboratory format rubric designed for each individual assignment submitted with the CMS grading procedures. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Assignments**Assignment Type**

Other

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Formative

Assignment

Collaborate on a geospatial think tank to identify a geospatial problem that may be solved. Identify a hypothesis or multiple factors to be analyzed, which data will be used and how, steps for analysis and potential outcome. Think Tank topics where diverse populations are focused on include an investigation of a broad spectrum of societal factors influencing the socio-economics, gender, gender-identity, age, racial and ethnic distribution and abundance of human activity represented in various parts of the world. Individually, determine a method, model or application you would like to explore to enhance this project. Select appropriate advanced spatial and statistical analysis for a geospatial model to help solve the problem.

How assignment will be adapted in online format

The "Think Tank" assignment is presented as a formalized, graded "discussion" in the CMS. Using appropriate accessibility standards, within the CMS, individual submit their contributions to the assignment asynchronously in a variety of different formats available within the CMS. Informal "group" discussions are also available within the CMS to promote student/student interaction in the completion and evaluation of their contributions to the Think Tank assignment prior to submitting their contributions in the formal discussion session. Student to student review and comments are made in the formal discussion session. Think Tank assignments are evaluated using a rubric specifically designed for these assignments. Evaluation/grading and constructive comments by the instructor are supplied to students using the CMS grading applications and formal asynchronous discussion session. Formal grading is done within the CMS grading application using the rubric designed for the assignment. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Assignment Type

Writing

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Formative

Assignment

Prepare a proposal that clearly states the purpose or intent of your subpart of the collaborative group project. Provide details about how you will acquire, prepare, build or analyze your part of the project, i.e. acquire data or create application. The proposal should include an exploration the geospatial constructs in relationship to equity and diversity. Identify the type of map, graph, report or combination of deliverables and how they will be validated. Prepare a diagram of the workflow procedures and iterative steps taken to determine those procedures.

How assignment will be adapted in online format

Directions for the assignment, discussion boards and submission requirements will be made available in the CMS. All assignments and directions must meet accessibility standards. Using appropriate accessibility standards, within the CMS, individual submit their contributions to the assignment asynchronously in a variety of different formats available within the CMS. Informal "group" discussions are available within the CMS to promote student/student interaction in the completion and evaluation of their contributions to the proposal writing assignment prior to submitting their contributions in the formal discussion session. Student to student review and comments are made in a formal discussion session. Evaluation/grading, using an appropriate rubric, and constructive comments by the instructor are supplied to students using the CMS grading applications and in a formal asynchronous discussion session. Rubric includes and evaluation of the comprehensiveness of the proposal, the accuracy and applicability of the information presented and how the proposal relates to the overall group project. Formal grading is done within the CMS grading application. All CMS contact uses appropriate accessible format standards. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Assignment Type

Other

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Summative

Assignment

Prepare a professional presentation for an intended audience, which includes graphics and an outline. GIS presentations include both a written narrative as well as multimedia aspects developed in ArcGIS Pro software. The project includes an analysis of geospatial data and the development of maps and statistical evaluations of data which summarize all pertinent information about a particular geospatial problem or concern. The presentation may include an investigation of a broad spectrum of societal factors influencing the socio-economics, gender, gender-identity, age, racial and ethnic distribution and abundance of human activity represented in various parts of the world. Outcomes should be presented in a compelling manner. Identify how your part of the project is integral to the collaborative group project.

How assignment will be adapted in online format

Directions for the assignment, discussion boards and submission requirements are made available asynchronously using various methods in the CMS. Synchronous, digitally facilitate (Zoom, Google Meets, etc.) sessions may be scheduled, when appropriate, for students to present projects. If synchronous meetings are not appropriate and/or available presentation may be submitted asynchronously using the CMS. Presentation must be accessible. Formal evaluation and grading use the grading functions of the CMS which allow for instructor-student feedback. Evaluation/grading, using an appropriate rubric, and constructive comments by the instructor are supplied to students using the CMS grading applications and in a formal asynchronous discussion session. Rubric includes and evaluation of the outline format and completeness, the comprehensiveness of the presentation, the accuracy and applicability of the information presented, appropriateness of graphics, and how the presentation represents the interests of the intended audience. Graded discussion sessions all for student-student evaluation and feedback which is monitored by the instructor with constructive and appropriate instructor-student feedback. All feedback must meet accessibility standards. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Explore GIS articles available on the internet. Find and review a minimum of three (3) websites of interest to you on how GIS is used to promote geospatial discussions of diversity. Read articles which place an emphasis on the articulation of how contributions to the discipline of Geospatial Science offer opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal



concerns represented the geographic distribution of humans around the globe. Summarize a formative outline of the methods employed in the development, research and implementation of each articles. Submit the outline for use for use in a graded discussion forum.

How assignment will be adapted in online format

Reading assignments may be found asynchronously using appropriate, accessible, internet, library, textbook or other college level resources. Reading assignment summaries are developed and submitted asynchronously using graded discussion formats of the appropriate CMS (course management system.) The discussion format allows for student-student and instructor-student constructive comment and evaluation. The reading assignment evaluation uses a rubric specifically designed for evaluating the appropriateness of the articles to the topic and the quality and quantity of the summary analysis. All submission must be in accessible formats. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Assignment Type

Other

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

In order to better understand and determine appropriate projection and coordinate systems, appraise data quality control and implement quality assurance; explore a GIS database on the internet. Closely examine the tabular data to determine if there are geostatistical applications for the data. Decide whether the data needs to be modified or transformed for spatial overlay analysis. Determine if it can be used for other types of analysis, such as clipping, merging, joining or buffering. Create a table that identifies the data's potential use and analytical capabilities (pros and cons). Project should include a discussion of a broad spectrum of societal factors influencing the socio-economics, gender, gender-identity, age, racial and ethnic distribution and abundance of human activity. Submit your summary report and pros and cons table for credit.

How assignment will be adapted in online format

The summary report is developed and submitted asynchronously using the CMS (Course Management system.) Student to student review and comments are made in a formal, graded discussion session. A rubric is used for the evaluation/grading of summary reports. Evaluation/grading, using an appropriate rubric, and constructive comments by the instructor are supplied to students using the CMS grading applications and in a formal asynchronous discussion session. The rubric includes and evaluation of the database reviewed including a discussion of the geostatistical applications for the tabular data; decisions on whether the data needs to be modified or transformed; and a determination if it can be used for other types of analysis, such as clipping, merging, joining or buffering. The rubric will include an evaluation of the created table to assess the data's potential use and analytical capabilities (pros and cons), the comprehensiveness of the report, the accuracy and applicability of the information presented, appropriateness of graphics, and how the GIS database represents a geospatial representation of the population intended. Constructive comments by the instructor are supplied to the student using the CMS grading applications and student participation in a formal asynchronous discussion session. Formal grading is done within the CMS grading application. All projects and evaluation must meet accessibility standards. Assessment and evaluation is done by the instructor usually within one (1) week of the due date of the assignment.

Course Materials

Textbooks

Harder, C., T. Ornsby, T. Balstrom (2018). Understanding ArcGIS: An ArcGIS Pro Project Workbook ESRI Press. ISBN: 978-1589485266
Allen, David W. (2016). GIS Tutorial 2: Spatial Analysis Workbook 10.1 4th ed Esri Press. ISBN: 978-1-58948-3378

Other Resources

Virtual Campus courses from ESRI Training Online

Open Educational Resources

Spatial Thinking in Planning Practice: An Introduction to GIS, <https://www.oercommons.org/courses/spatial-thinking-in-planning-practice-an-introduction-to-gis>

Class Size Information

Class Size

32

Class Size Category

G - Large lab 32

Diversity and Inclusion

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 students opportunities to foster empathy, expose variant interpretations, and exhibit diverse societal concerns represented by the geographic distribution of humans around the globe. The goal is to support students in connecting their personal experiences with the terms and concepts presented in the course and to validate the student's life experience by seeing themselves in the material and assignment requirements. Class activities, reading, lecture, discussions and student technical story mapping projects encourage and allow students to explore various interpretations and understandings of their individual relationships to geospatial organization related to their own diversity. Topics where diverse populations are focused on include an investigation of a broad spectrum of societal factors influencing the socio-economics, gender, gender-identity, age, racial and ethnic distribution and abundance of human activity represented in various parts of the world.

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

To better support diverse learners, formative and summative active learning strategies are represented in the exploration of geospatial concepts and analytical methodologies. These strategies include in-class and out-of-class assignments that explore the geospatial constructs in relationship to equity and diversity. Lecture and laboratory instruction, included opportunities for discussion and class activities where students can share with the class and evaluate their own cultural experiences through the application of geospatial information science materials and methods. The course uses geospatial case studies reflecting diverse levels of learning experiences which allow students to see themselves at an appropriate level of interaction with the material. In addition, students are encouraged to practice new applications of geospatial analysis from diverse socio-cultural perspectives. Various methods of evaluation include the necessity of formative and summative assessments, designed to accommodate diverse learner assessment styles, align with the course geospatial investigation objectives and content. Lectures, discussions, group activities, assessments and final project support the infusion of student feedback and interaction with the instructor.

Interactions

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

Students are encouraged to work together to solve geospatial problems both in lecture and laboratory situations. Student are required to participate in weekly student to student discussion sessions on topics related to the course materials. Formal assignments require students to work in "workplace units" to solve geospatial problems. Students are also organized into "laboratory groups" to work on laboratory assignments. These groups "meet" synchronously and/or asynchronously using CMS functions or other approved, accessible meeting programs such as Zoom or Google meets. Student-to-student interaction is encouraged to discuss lecture and laboratory materials, view videos, comment on formalized reading and writing assignments and to provide constructive feedback on a variety of geospatial projects including the final Capstone project. Formal, graded discussions are represented as part of the course requirements in which students are required to do an analysis of a particular geospatial problem and then to respond to classmates' analysis of the same problem. "Working group" participation is a requirement of the semester final "Capstone" project. This student-to-student interact is designed to simulate aspects of GIS careers that require input from a variety of geospatial investigators.

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

The instructor facilitates instructor to student interactions not only in lecture but in lab as well. Lecture sessions include group discussions of relevant topics presented in the course. These discussions are directed by the instructor but are designed to encourage students to reflect on the topics and articulate an understanding of the material to the instructor and other students. Laboratory instruction is designed to include lab group as well as intensive instructor student one-on-one instruction in the use of the ArcGIS professional software. To better support a diverse range of learners, instructors are encouraged to incorporate formative and summative active learning strategies in the laboratory assignments which promote students to ask questions and get clarification of examples from the instructor..

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

Student to content interaction is incorporated in both lecture and laboratory presentations and assignments as well as weekly laboratory and a Capstone semester project. Students are introduced to content in the lecture portion of the class and interact with the content in many ways including summarizing multimedia presentations, short quizzes, discussions and semester examinations. Students are required to apply lecture content to laboratory assignments. Laboratory assignments require students to produce

ArcGIS output using information discussed and developed in lecture. This output represents a variety of data presentations all of which include mapping and data analysis of specific geospatially related questions; what resources are being explored; who (the diversity of populations) are impacted by the resources; where the resources are congregated and the historical data influencing the geospatial distributions. These activities are designed to help students develop an individualized understanding of the material and concepts introduced in the course.

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

The goal is to support students in connecting their experiences with the terms and concepts presented in the course and to validate the student's life experience by seeing themselves in the material and assignment requirements. Class activities, reading, lecture, discussions and student technical story mapping projects encourage and allow students to explore various interpretations and understandings of their individual relationships to geospatial organization related to their own diversity, socio-economic status, gender, ethnic-racial background and other aspects of their own identity and history.

Key: 1686