GIS-520: INTERMEDIATE GEOGRAPHIC INFORMATION SCIENCE (FORMERLY GEOG-520)

Effective Term
Fall 2024

BOT Approval Date
12/14/2023

Discipline
GIS - Geospatial Information Science

Course Number
520

Course Title
Intermediate Geographic Information Science (formerly GEOG-520)

Short Title
Intermediate GIS

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
3.00

Lab Units
1.00

Total Units
4.00

Hours

Lecture Contact Hours
48-54

Out of Class Hours Lecture
96-108

Lab Contact Hours
48-54

Out of Class Hours Lab
0.00

Total Contact Hours
96 - 108

Total Out of Class Hours
96 - 108

Total Student Learning Hours
192 - 216

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 more advanced geographic analysis using current professional GIS application software. This course enhances professional potential in a geospatial career. Advanced topics include geodatabase methods, topology, customized and automated processes, and cartographic representation. Legal and ethical issues, geospatial certification, professional presentation, online collaboration and networking at GIS events prepare students for entering a GIS profession in many discipline related fields. Exploration of scientific models and methods for advanced analysis prepare students for independently planning, implementing and producing a deliverable real-world GIS project. (formerly GEOG-520)

Attach Supporting Documents
Introduction to Geospatial Information Department.docx
Addendum 3A LABOR MARKET CENTERS of EXCELLENCE Geographic_Information_Systems_GIS_1.docx

Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)
GEOG-115 (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 an outline of 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. Adapt online teleconferencing media for simultaneous and interactive collaboration on digital map deliverables.
10. Prepare and deliver a professional GIS presentation for a specific audience
11. Provide “historical context” to better capture the deeper connections between socio-historical forces and the geospatial distribution.
12. Evaluate relationships to geospatial organization related diversity, socio-economic status, gender, ethic-racial background and other aspects of the geospatial distribution of human populations.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. The student will determine which data type (i.e., raster or vector) are appropriate for various analytical applications.
2. The student will differentiate between spatial relationships of adjacency, connectivity and overlap in relation to distance, direction and topology.
3. The student will discuss quantitatively the meaning behind spatial patterns, relationships and trends.
4. The student will identify how spatial relationships can influence statistics and strategies for sampling, for instance field data collection.
5. The student will exercise reflective thought.

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 GIS in Decision Making
- A.Model versus real world
  - 1.Exploring the World
  - 2.Biotic and Abotic Aspects of Geospatial Distribution
  - 3.Distribution of Human Population
    - a)Socio-economic Influences
    - b)Ethnic and Racial Considerations
    - c)Gender aspects of Geospatial Information
- B.Advantages and Problems
- C.Applications of GIS and decision making

II.GIS Data
- A.Representing real world object on maps
- B.Vector model
- C.Modeling feature behavior with topology
- D.Raster model
- E.Data quality
- F.Data sources

III.Mapping GIS Data
- A.Mapping features
  - 1.Mapping aspects of human diversity
  - 2.Racial and ethnic aspects of human populations
  - 3.Gender aspects in human spatial distributions
- B.Displaying rasters
- C.Classifying numeric data

IV.Presenting GIS data
- A.Map design/Layouts
  - 1.Aspects of human diversity as represented in space and time.
  - 2.Equity of human spatial organization.
- B.Symbols
- C.Coordinate Systems

V.Attribute Data
- A.Overview of tables

- B.Database Management Systems
- C.Queries on tables
- D.Joining and relating tables
- E.Summarizing tables
- F.Field types

VI.Queries
- A.Attribute queries
- B.Spatial queries

VII.Spatial Joins
- A.Cardinality
- B.Types of joins
- C.Feature geometry
- D.Distance joins

VIII.Raster Analysis
- A.Raster data
- B.Surface analysis
- C.Continuous features

IX.Network Analysis
- A.Network types
- B.Generic tree
- C.Utility trace

X.Geocoding
- A.Geocoding styles
- B.Reference data
- C.Location data

XI.Coordinate systems
- A.Geographic
  1. Latitude and Longitude
  2. UTM
  3. State Plane
- B.Map scales
- C.Map projections
- D.Raster coordinates

XII.Editing
- A.Snapping features
- B.Adjacent polygons
- C.Topology errors
- D.Topology rules
- E.Complex polygons
- F.Combining features
- G.Buffering
- H.Stream digitizing

XIII.Geodatabases
- A.Designing and creating
- B.Creating feature datasets
- C.Default values
- D.Domains
- E.Split and merge
- F.Subtypes

G.Annotation
XIV.Metadata
A.Standards
B.Data quality
C.Format
D.Acquiring
E.Developing
XV.Introduction to Advanced Spatial Analysis Concepts
A.Single and multiple layer operations
B.Error Propagation
C.Proximity, adjacency, and connectivity
D.Buffers
E.Terrain analysis (digital elevation models)
1.Hillshade
2.Line of Sight
3.Profiles

Course Lab Content
I.ArcGIS Overview
A.Administrator
B.ArcMap
C.ArcCatalog
D.ArcToolbox
E.Advanced Extensions
F.Data files in ArcGIS
II.Software and Hardware Requirements for GIS
A.Applications and software specifications
B.Hardware requirements for various applications
C.Peripheral devices
III.ArcGIS
A.Map documents
B.Reports
C.Map Scales
D.Labeling, text and annotation
E.ArcMap Layout and templates
IV.Introduction to Data Structures
A.Raster
1.Grids
2.Applications
a)Investigating human distributions
b)Exploring spatial organization of ethnic populations
c)Gender as a distribution factor
B.Vector
1.Points, lines, areas
2.Applications
V.Define Data Requirements
A.Accuracy
B.Acquisition
C.Databases
D.Manipulation

VI. Tables in ArcGIS
- A. Editing and calculating fields
- B. Importing tables
- C. Adding x-y coordinates

VII. Layers in ArcGIS
- A. Processing with selections
- B. Interactive selection
- C. Selecting by attributes
- D. Selecting by location
- E. Choosing the selection method
- F. Managing query results

VIII. Spatial Joining tables
- A. Join types
- B. Setting up joins

IX. Geoprocessing
- A. ArcToolbox
- B. Spatial Analyst
- C. 3D Analyst
- D. Overlay Analysis
- E. Geostatistical Analyst
- F. Other Extensions

X. Raster analysis
- A. Storing rasters
- B. Spatial Analyst extension

XI. Network analysis
- A. Utility network analyst toolbar
- B. Building networks

XII. Geocoding
- A. Setting up address locator
- B. Running Geocoder

XIII. Data management
- A. Labeling coordinate systems
- B. On the fly project
- C. Projecting data
- D. Coordinate system problems

XIV. Editing data
- A. Editor toolbar
- B. Feature templates

XV. Editing and Topology
- A. Changing existing features
- B. Map topology
- C. Planar topology

XVI. Geodatabases
- A. Defined
- B. Designing and creating
- C. Creating feature datasets
- D. Default values
- E. Domains
- F. Split and merge

G.Subtypes
H.Annotation
XVII.Metadata
A.Metadata editor
B.Metadata templates

Methods of Instruction

Method

Discussion

Integration

Instructor monitored discussions that focus on applications, methods, problem-solving and decision support systems. Discussions encourage and allow students to explore various interpretations and understandings of their individual relationships to geospatial organization related to their own diversity.

DE Adaptations for MOI

Instructor-moderated student participation in CMS discussion forums or through teleconferencing media will focus on applications, methods, problem-solving and decision support systems. These discussions will facilitate interactions and collaborations as students meet the objectives of analyzing spatial data to evaluate trends and linkages as well as to assess the accuracy of spatial data.

Method

Homework

Integration

Homework exercises emphasize data acquisition, database design, analysis, project development and quality assurance. 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 homework assignments consist of spatial exercises emphasizing topics related to the lecture material and are submitted online for grading by the instructor. These may be a mix of formative and summative assessments and will focus on mastery of sampling strategies, approaches to spatial analysis and the ethical considerations relevant to acquiring and using spatial data. ArcGIS Pro output is uploaded as assignments in the CMS using appropriate file types. Map projects are uploaded as screen captures. Story Maps may take a number of formats including, but not limited to, PowerPoint and Google presentation files. Projects are reviewed, evaluated, and commented on by the instructor and returned to students using the CMS.

Method

Lecture

Integration

Lecture explores spatial data, models for scientific inquiry and problem solving in the real world from the perspective of several disciplines. Professional understanding of legal and ethical responsibilities in cartographic representation, including data quality control, are emphasized. Lectures are designed to help 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 covered in the lectures.

DE Adaptations for MOI

Lecture material are delivered via captioned video of instructor presentations or other accessible third party educational video lectures. Accessible PowerPoint, or similar presentation software, is used to supplement written and auditory presentations of lecture material. Auditory presentations meet accessibility standards. Lectures may also be presented as written narratives or asynchronous accessible discussions. Students are able to pose questions to the instructor both asynchronously using video conference tools, email, and discussion forums. Upload protocols in the current CMS are used to submit lecture materials.

Method

Observation and Demonstration

Integration

Software demonstrations emphasize discipline-specific spatial applications and methods for scientific inquiry. 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 the geographic distribution of humans around the globe.

DE Adaptations for MOI

Students asynchronously observe and evaluate prerecorded software demonstrations, provided in approved accessibility formats, of various discipline-specific geospatial methods for scientific inquiry in the CMS, course management system. These demonstrations guide students through advanced spatial and statistical analysis to meet course objectives. All assignments, maps, and visual representations presented meet accessibility standards and are accompanied by accessible data files and alt text explanations.

Method

Projects

Integration

Student projects involve preparation and professional presentation of a real-world scenario project. Students are encouraged to develop projects 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

Projects will be submitted using CMS software. Projects are reviewed, evaluated and commented on by the instructor and returned to the students using a variety of formats available in the CMS. Evaluation (grading) is provided in the CMS gradebook. Constructive comments, when appropriate, are reviewed in the group discussion forums and formal discussion assignments.

Method

Activity

Integration

Activities involve real-world spatial exercises and scientific models from various disciplines in the social and physical sciences. Diverse populations are focused on to 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

Examples of the analysis of geospatial problems and concerns are presented in both lecture and laboratory. Students are given access to a variety of different fictional databases representing problems and concerns investigated using GIS information and data. Activities are detailed, presented and submitted, in assessible formats where appropriate, using CMS software. Activities are evaluated and commented on by the instructor, within the CMS. Evaluation/grading is done using the CMS software. When appropriate some activities are reviewed by classmates and the instructor in both the informal and formal, graded, discussion sessions. When appropriate valuation of the activity is usually given within 1 week of the due date of the assignment.

Methods of Evaluation

Method

Class Participation

Integration

Student participation in discussions are graded with a rubric representing various levels of assimilation of course content. In this course class participation 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 the geographic distribution of humans around the globe.

DE Adaptations for MOE

Student participation in the CMS discussion forums are graded with a rubric representing various levels of assimilation of course content. Students will demonstrate a mastery of course objectives through their ability to discuss complex spatial problems, propose hypotheses, suggest appropriate methods and analytical tools, and evaluate the accuracy of their results. Instructor feedback is usually given with 1 week of the assignment due date.

Method

Exams/Tests

Integration

Exams/Tests include a variety of question formats that evaluate student comprehension of lectures, assigned readings and exercises. Examinations include assessing student knowledge of 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 MOE

Online exams/tests will include a variety of question formats that evaluate student comprehension of lectures, assigned readings and exercises. The exam/tests are delivered via the CMS quiz feature. Exam questions will assess student understanding of spatial analysis and the interpretation of spatial relationships, appropriate tools for addressing spatial questions, and proper implementation of statistical tests of accuracy. Essay questions will focus on broader ethical concerns and appropriate spatial inferences. The instructor provides evaluation and feedback using the appropriate feedback mechanisms provided in the CMS as well as exam/test review sessions and both informal and formal discussion sessions when appropriate. Instructor feedback is usually given with 1 week of the examination due date.

Method

Homework

Integration

Weekly homework exercises on software applications from various scientific fields enforce GIS concepts and are graded on a point system, as a percentage of the course grade. Homework projects encourage and allow students to explore various interpretations and understandings of their individual relationships to geospatial organization related to their own diversity.

DE Adaptations for MOE

Weekly homework exercises on software applications from various scientific fields will enforce GIS concepts and be graded on a point system, as a percentage of the course grade and be delivered via the CMS. Homework assignments will provide an opportunity for the stepwise mastery and scaffolding of course objectives, beginning with basic spatial relationships and continuing through complex analyses. Homework will be scored objectively, based on rubrics provided for individual homework exercises, with adequate feedback from the instructor for students to master concepts provided to students in the CMS. When appropriate, homework assignments are discussed instructor to student and student to student in both informal and formal grades discussion sessions using the CMS. Instructor feedback is usually given with 1 week of the assignment due date.

Method

Capstone Project

Integration

The Capstone project is an example of 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. As an 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 the geographic distribution of humans around the globe students are encouraged to consider these ideas in their Capstone Project. Students individually submit a document outlining their role on the project, including a flow chart that graphically displays their integral role. The Capstone project is evaluated on how well the geospatial problem or concern has been articulated; the design of research endeavor; the applicability of data sources used; quality and quantity of GIS output used to evaluate the problem; the appropriate use and execution of ArcGIS Pro software; and the "Story Map" design and presentation. Capstone projects will be graded based on a rubric that assesses various levels of content, organization, audience identification, compelling message, visual aids and comprehension, as well as appropriate grammar and presentation skills.

DE Adaptations for MOE

Students work in groups facilitated by both formal and informal "discussion" sessions organized within the CMS. When appropriate and available, students are encouraged, but not required, to use synchronous "face-to-face" interaction software similar to Zoom to discussion their individual roles in the development and completion of the Capstone project. Capstone project development assignments are submitted by individual students for evaluation and comments at various times during the semester. Capstone projects are submitted and evaluated within the CMS. Capstone projects include GIS "Story Maps" Story Maps are submitted as PowerPoint or Google Presentation formats. All projects are expected to meet accessibility requirements. Capstone projects include written descriptions of the project, data used, evaluation of data, photos, maps and GIS information files. All aspects of the Capstone projects can be submitted within the CMS. The rubric is discussed and reviewed, within the CMS, with students through out the course in a variety of assignments which culminate in the semester Capstone project. At various stage in the Capstone project development, detailed evaluations and reviews of the Capstone project development are returned to individual students using the appropriate CMS procedures. The final project is evaluated/graded in the CMS, by the instructor, using the Capstone Project rubric, with appropriate constructive feedback to students. Instructor feedback is usually given with 1 week of the assignment due date.

Assignments

Assignment Type

Reading

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Formative

Assignment

Gather information to participate in a GIS "think tank" to identify a geospatial problem that may be solved. Read to identify and develop a hypothesis; explore multiple factors to be analyzed; which data will be used and how; review steps for analysis and potential outcomes. Reading topics should include a focus on 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. Research a method, model or application you would like to explore to enhance during the "think tank" discussion with other students included in this project.

How assignment will be adapted in online format

Information is gathered using internet, on-line library, video, podcasts, hard copy an/or other asynchronously available sources. A formative outline of the information assignments can be completed asynchronously using the CMS. The "think tank" assignment is discussed, asynchronously, in a formal, graded "Discussion". The rubric for the discussion includes an evaluation of the quantity and quality of "readings" evaluated. The instructor will provide appropriate constructive feedback and evaluation/grading using the CMS. Instructor evaluation feedback is usually given with 1 week of the assignment due date.

Assignment Type

Writing

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Summative

Assignment

Prepare a proposal that clearly states the purpose or intent of your part of a 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. 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. Include a discussion of how this assignment helps in connecting your personal experiences with the terms and concepts presented in the course and helps to validate your life experience by seeing yourself in the material and assignment requirements.

How assignment will be adapted in online format

The assignment will be defined, prepared and submitted asynchronously using Canvas course management software. The proposal assignment is submitted in the CMS where it is reviewed, evaluated using a rubric, and given constructive feedback. In addition the proposals are discussed, asynchronously, in a formal, graded "Discussion". The rubric for the discussion includes an evaluation of the quantity and quality of "readings" evaluated. The instructor will provide appropriate constructive feedback and evaluation/grading using the CMS. Instructor evaluation feedback is usually given with 1 week of the assignment due date.

Assignment Type

Other

In-class and/or outside of class

In-class
Outside of class

Formative or Summative

Summative

Assignment

Prepare your role in a professional presentation, Capstone project, for an intended audience, which provides an analysis of a GIS problem of concern. Your project should be presented in a compelling manner. Identify how your part of the project is integral to the collaborative group project. Develop and present your area of expertise pertaining to the project. Be sure to incorporate considerations of diverse populations 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. Presentations will be 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 or audible.

How assignment will be adapted in online format

Assignment will be presented, developed and submitted asynchronously using CMS software. Students receive evaluation and constructive feedback using the review processes of the CMS. In addition instructor/student discussions, using the CMS, will review group presentations for constructive review and feedback. Instructor evaluation feedback is usually given with 1 week of the assignment due date.

Assignment Type

Other

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Collaborate with classmates on a geospatial "think tank" to identify a geospatial problem that may be solved using ArcGIS Pro. Identify a hypothesis or multiple factors to be analyzed, which data will be used and how, steps for analysis, and potential outcome. This assignment should include connecting your personal experiences with the terms and concepts presented in the course. Individually, determine a method, model or application you would like to explore to enhance this project. The grading rubric includes the evaluation of the individual's contribution to the collaborative discussion as well as the appropriateness of the contribution related to the problem being analyzed.

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. 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. Instructor evaluation feedback is usually given with 1 week of the assignment due date.

Course Materials

Textbooks

Maribeth Price (2019). Mastering ArcGIS, 8th edition McGraw Hill. ISBN: 978-0078095146
Harder, C., T. Ornsby, T. Balstrom (2018). Understanding GIS: An ArcGIS Pro Project Workbook ESRI Press. ISBN: 978-1589485266

Other Resources

Virtual Campus courses available from ESRI Training Online

Open Educational Resources

David DiBiase (2019). Nature of Geographic Information Compass Open Ed. ISBN: na

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.

In this course an 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 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 represent 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, ethic-racial background and other aspects of their own identity and history.

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