CNST-1740: FUNDAMENTALS OF GEOGRAPHIC INFORMATION SCIENCE

Cuyahoga Community College

Viewing: CNST-1740 : Fundamentals of Geographic Information Science

Board of Trustees:

March 2018

Academic Term:

Fall 2020

Subject Code

CNST - Construction Engineering Technology

Course Number:

1740

Title:

Fundamentals of Geographic Information Science

Catalog Description:

Introduction to geographic information science with a focus on learning Geographic Information Systems (GIS) software. Topics include map, interpretation, and analysis, coordinate systems, map projections, scales, topographic mapping, accuracy versus precision, spatial analysis techniques, types of thematic mapping, sources of data, basic database management, advantages and limitations of GIS, and an introduction to applications in engineering, engineering technology, and the sciences. Students are expected to have basic computer skills prior to taking this course.

Credit Hour(s):

3

Lecture Hour(s):

2

Lab Hour(s):

2

Requisites

Prerequisite and Corequisite

MATH-1410 Elementary Probability and Statistics I , or MATH-1470 Modern Mathematics for Business and Social Sciences I , or MATH-1530 College Algebra or higher.

Outcomes

Course Outcome(s):

Acquire, create, update and/or manage spatial data from disparate sources.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Identify types of maps and appropriate ways in which they can be used.
2. Explain the value, limitations, and appropriate use of different types of thematic maps.
3. Discuss the ways in which different types of geographic information are represented on maps.
4. Categorize geographic data at appropriate cartographic levels.
5. Identify sources of GIS data and prepare data for use in a GIS.
6. Explain the components, context, and aspects of a GIS, including advantages and limitations.

Course Outcome(s):

Use a GIS Software to display data in a legible format and perform basic GIS functions

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Use maps to measure distance, compute area, and analyze spatial patterns.
2. Apply basic cartographic principles through designing and producing effective maps.
3. Recognize real-world applications of a GIS.
4. Explain how reality is represented and transformed in special datasets.
5. Categorize geographic data at appropriate cartographic levels.
6. Discuss the concept of map projections and the uses and limitations of general projection categories.
7. Recognize map projections and coordinate systems and apply them appropriately to spatial data.
8. Identify the elements of a map, including symbolization and scale, demonstrate the appropriate use of map elements.

Course Outcome(s):

Visualize, summarize, analyze, and interpret spatial data.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Identify types of maps and appropriate ways in which they can be used.
2. Interpret and identify geographic patterns from different types of maps.
3. Use maps to measure distance, compute area, and analyze spatial patterns.
4. Explain the value, limitations, and appropriate use of different types of thematic maps.
5. Discuss the concept of map projections and the uses and limitations of general projection categories.
6. Identify the elements of a map, including symbolization and scale, demonstrate the appropriate use of map elements.

Methods of Evaluation:

1. Midterm Exam
2. Final Exam
3. Lab Assignments
4. Case Studies
5. Course Project

Course Content Outline:

1. Introduction to database, data types, data mining, and sources of data
   a. Introduction to MS Excel
   b. Introduction to MS Access
   c. Sources of Data
      i. State of Ohio Departments
      ii. Counties
      iii. Non-profit organizations
      iv. Census Bureau
      v. USGS
   d. Types of Data
   e. Limitations of data and introduction to metadata
   f. Symbology typically utilized in different subareas
   g. Introduction to Coordinate Systems
   h. Identifying and switching between Coordinate Systems
   i. Introduction to Set Theory
2. Introduction to geographic information systems (GIS)
   a. Overview of GIS
      i. Advantages
      ii. Limitations
   b. Types of GIS Software
   c. Types of joins

   d. Cartographic prinicples
   e. Map projections
   f. Vector and raster modeling
   g. Editing spatial data
   h. Attribute data and hierarchy introduction
   i. Data display
3. Applications in GIS
   a. Network Analysis Introduction
   b. Uses of GIS in organizational management
   c. Abbreviated introduction to modeling
   d. Query Building and Introduction to ArcObjects
   e. Data Collection

Resources

Law, Michael and Amy Collins. *Getting to Know ArcGIS for Desktop.* 4th. Redlands, California: ESRI Press, 2015.

Lambert, Joan and Steve Lambert. *Microsoft Access 2016 Step by Step.* 2016. Microsoft Press: S.l., 2015.

Campbell, J. *Map Use and Analysis.* 4. Boston: McGraw-Hill, 2001.

Monmonier, M. *How to Lie with Maps.* 2nd. Chicago: University of Chicago Press, 1996.

Resources Other

ESRI Training Website: http://www.esri.com/training/main
County Auditor Websites for GIS data, ODOT, US Census TIGER files, etc.
ArcGIS Software

Instructional Services

OAN Number:
Transfer Assurance Guide OSS051

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