

CNST-2510: INTRODUCTION TO ASSET MANAGEMENT

Cuyahoga Community College

Viewing: CNST-2510 : Introduction to Asset Management

Board of Trustees:

1/30/2025

Academic Term:

Fall 2025

Subject Code

CNST - Construction Engineering Tech

Course Number:

2510

Title:

Introduction to Asset Management

Catalog Description:

Introduction to asset management with a focus on utility systems spread over a geographic region. Covers principles of cartography and methods for presenting geographic information. Coordinate systems, map projections, scale, topographic mapping, thematic mapping, spacial analysis methods, and mapping accuracy are expanded upon from introductory course. Use Geographic Information Systems (GIS) to analyze and model engineering systems. Probability models and ways to achieve levels of service within an overall system will be covered. Laboratory element with case studies incorporated.

Credit Hour(s):

3

Lecture Hour(s):

2

Lab Hour(s):

3

Requisites

Prerequisite and Corequisite

MET-2430 Engineering Probability and Statistics; and CNST-1740 Fundamentals of Geographic Information Science.

Outcomes

Course Outcome(s):

Use GIS Software to display data in a usable format.

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. Explain the concept of map projections and the uses and limitations of general projection categories.
2. Identify types of maps and appropriate ways in which they can be used.
3. Discuss the ways in which different types of geographic information are represented on maps.
4. Interpret geographic patterns from different types of maps.

Course Outcome(s):

Compare different types of probabilistic models that can be used in evaluating level of service with utilities

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 geographic patterns from different types of maps.
3. Discuss the elements of a map, including symbolization and scale, demonstrate the appropriate use of map elements.

Course Outcome(s):

Apply foundational knowledge of Storm Water Management Model (SWMM) and other utility management models that can be used to better assess risk management of utilities.

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. Explain the concept of map projections and the uses and limitations of general projection categories.
2. Discuss the value, limitations, and appropriate use of different types of thematic maps.
3. Categorize geographic data at appropriate cartographic levels.

Course Outcome(s):

Interpret geographic patterns from different map formats.

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. Explain the concept of map projections and the uses and limitations of general projection categories.
2. Discuss the value, limitations, and appropriate use of different types of thematic maps.
3. Discuss the elements of a map, including symbolization and scale, and demonstrate the appropriate use of map elements.
4. Categorize geographic data at appropriate cartographic levels.

Course Outcome(s):

Utilize GIS Tools to combine and manipulate different forms of 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. Explain the concept of map projections and the uses and limitations of general projection categories.
2. Discuss the value, limitations, and appropriate use of different types of thematic maps.

Course Outcome(s):

Identify and prepare sources of data for input in a GIS and utility model.

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. Explain the concept of map projections and the uses and limitations of general projection categories.
2. Discuss the ways in which different types of geographic information are represented on maps.
3. Use maps to measure distance, compute area, and analyze spatial patterns.

Methods of Evaluation:

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

Course Content Outline:

1. Expansion on available data sources in analysis of systems
 - a. Refresher on MS Excel data
 - b. Types of joins and ways to pull data from databases using MS Access
 - c. Refresher on sources of data and ways data can be utilized
 - i. State of Ohio Departments (Transportation Information Mapping System (TIMS), Ohio Department of Natural Resources (ODNR), etc.)
 - ii. Counties
 - iii. Non-profit organizations
 - iv. Census Bureau
 - v. United States Geological Survey (USGS)
 - d. Refresher on symbology and coordinate systems
2. Refresher on using geographic information systems (GIS)
 - a. Types of joins
 - b. Map projections
 - c. Vector and raster modeling
 - d. Editing spatial data
 - e. Attribute data and hierarchy introduction
 - f. Data display
3. Other Data Sources and Legal Introduction
 - a. Decisions on what data may be needed
 - b. Configuration of a data dictionary
 - c. Use of GPS (Global Positioning System)
 - d. Manual methods
 - e. Remote sensing and aerial photography
 - f. Basics of legal descriptions and how to read them
 - g. Introduction to legal elements (property rights, easements, data ownership)
 - h. Brief introduction to legal system
4. Fundamentals of asset management
 - a. Defining asset management and benefits to society
 - b. Asset management process
 - c. Levels of service
 - d. Forecasting future demand
 - e. Decision making techniques
 - f. Maintenance strategies
 - g. Quality management introduction
 - h. Asset management plans
 - i. Using data for decision making
5. Modeling utility systems using GIS
 - a. Identifying risk within a system
 - b. SWMM modeling introduction and other models introduction
 - c. Probability based modeling
 - d. Triangular Irregular network Node (TINN) and elevation datasets
 - e. Network modeling
 - f. Service delivery models
 - g. Case studies

The Course Schedule is subject to change due to pedagogical needs, instructor discretion, parts of term, and unexpected events.

Resources for the Instructor

IPWEA. *International Infrastructure Maintenance Manual*. 5th ed. Sydney: IPWEA, 2015.

Law, Michael and Amy Collins. *Getting to Know ArcGIS Pro 3.2*. 5th. Redlands, California: ESRI Press, 2024.

Uddin, W., Hudson, W. *Public Infrastructure Asset Management*. 2nd. New York: McGraw Hill, 2013.

Additional Resources for the Instructor

Army Corp of Engineers, Best Practices in Asset Management 2013-R-08 http://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/2013-R-08_Best_Practices_in_Asset_Management.pdf

ESRI's Utilities and Communications Portal (2024) <https://doc.arcgis.com/en/arcgis-solutions/latest/reference/introduction-to-communications-utility-network-foundation.htm>

US EPA Asset Management Guide (2024) http://water.epa.gov/infrastructure/sustain/asset_management.cfm

ESRI - Web Series - Asset Management (2024) <https://www.youtube.com/watch?v=4QWggU5h5KQ>

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