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COURSE INFORMATION

Alternate Title: Geomatics for Telecomm

Description:

10-451-106 GEOMATICS FOR TELECOMMUNICATIONS ...provides the opportunity for the learner to develop the knowledge, skills, process, and understanding of basic surveying principles, instruments in the field, making computations, and generating computerized maps. (Co-Requisite: 10-607-112, AutoCAD for Civil Engineering)

Instructional Level: 10

Total Credits: 3

Total Hours: 108

COURSE HISTORY

Status: Active

Active Date: 5/23/2021

Last Revision Date: 1/5/2023

Revised By: Kristina Wendricks (15002977)

Last Approval Date: 1/4/2023

Approved By: Kristina Wendricks (15002977)

COURSE COMPETENCIES

1. Discuss the history and function of Land Surveying and Geomatics

Domain: Cognitive Level: Understanding Status: Active

Assessment Strategies

1.1. Objective exam/quiz

Criteria

Learners will be successful when they are able to:

- 1.1. Explain Geomatics and its function in today's society
- 1.2. Match the various components of Geomatics (collection, distribution, storage, analysis, processing, analysis, presentation, and consumption) to each example of a who or what would deliver that component
- 1.3. Recognize and name basic approaches to geographic representation
- 1.4. Identify and explain properties of geographic data
- 1.5. Discuss the kinds of questions that GIS can help answer
- 1.6. Match important dates and time periods with the proper surveying advancements.

Learning Objectives

- 1.a. Discuss Geomatics and its' function
- 1.b. Identify the various components and disciplines of Geomatics
- 1.c. Summarize the history of Land Surveying

2. Discuss the components of Land Surveying for Geomatics

Domain: Cognitive Level: Understanding Status: Active

Assessment Strategies

2.1. Objective exam/quiz

Criteria

- 2.1. Recognize various career and job descriptions associated with Land Surveying
- 2.2. Discuss tools available and what tool to use in each situation
- 2.3. Identify different surveying tools and equipment
- 2.4. Determine the difference between accuracy and precision when Land Surveying
- 2.5. Identify examples of a Mapping Survey
- 2.6. Identify examples of a Construction Survey
- 2.7. Identify examples As Built Survey
- 2.8. Explain the differences between degree, minutes, seconds (DMS) and decimal degrees
- 2.9. Discuss why feet is generally used for surveys
- 2.10. Discuss azimuth and bearings
- 2.11. Identify Personal Protective Equipment (PPE) to be used while working in field environments
- 2.12. Identify hazards of working in municipal settings
- 2.13. Identify hazards of nature such as animals, plants, and weather

Learning Objectives

- 2.a. Identify the roles of the workforce in Land Surveying
- 2.b. Identify different surveying tools and equipment
- 2.c. Discuss accuracy vs precision
- 2.d. Explain different types of surveys that can be conducted and when they would be used
- 2.e. Discuss the typical Units of Measurements used by Land Surveyors
- 2.f. Articulate Field Safety Procedures

3. Apply mathematical concepts relating to Geomatics

Domain: Cognitive Level: Applying Status: Active

Assessment Strategies

3.1. Objective exam/quiz

Criteria

Learners will be successful when they are able to:

- 3.1. Convert various units of measurements from one unit to another and between the Imperial system and Metric system.
- 3.2. Execute Order of Operations
- 3.3. Calculate Percentages
- 3.4. Perform Isolating Variables and Solving Equations
- 3.5. Calculate Slopes / Slope Percentages

- 3.6. Calculate decimal degrees (DD) and degree minutes seconds (DMS) Conversions
- 3.7. Categorize acute, obtuse, right, and straight angles
- 3.8. Calculate polygon sum of angles
- 3.9. Apply the Pythagorean Theorem to right angles
- 3.10. Carryout Trigonometry: SOHCAHTOA
- 3.11. Conduct Azimuth and Bearings conversions
- 3.12. Determine angles of closed traverse

Learning Objectives

- 3.a. Compare and contrast the units of measurements in Imperial and Metric systems.
- 3.b. Calculate Mathematical concepts relating to Geomatics

4. Execute a variety of leveling procedures

Domain: Cognitive Level: Applying Status: Active

Assessment Strategies

- 4.1. Objective exam/quiz
- 4.2. Project

Criteria

Learners will be successful when they are able to:

- 4.1. Discuss how sea level vertical datum was established
- 4.2. Discuss where can find known elevations and benchmarks to apply to our worksite
- 4.3. Discuss traditional leveling, digital leveling, and establishing elevation with GNSS
- 4.4. Experiment with "Low Tech" Leveling with common items
- 4.5. Experiment with "Medium Tech" Leveling with survey grade equipment
- 4.6. Experiment with "High Tech" Leveling equipment such as GPS
- 4.7. Compare the differences between "Low Tech", "Medium Tech" and "High Tech

Learning Objectives

- 4.a. Discuss the importance of leveling
- 4.b. Perform different leveling operations

5. Apply various approaches to distance measurements

Domain: Cognitive Level: Applying Status: Active

Assessment Strategies

- 5.1. Objective exam/quiz
- 5.2. Project

Criteria

Learners will be successful when they are able to:

- 5.1. Determine distance measurements on a variety of maps using the provided scales
- 5.2. Use a tape and mark out a distance along a predetermined path
- 5.3. Use a wheel and mark out a distance along a predetermined path
- 5.4. Execute Horizontal Distance and Slope Distances Measurements in an inside environment
- 5.5. Execute basic stationing and offset measurements using basic tools and equipment inside of the lab

- 5.6. Discuss higher precision means of stationing and offsets
- 5.7. Calculate missing angle of traverse
- 5.8. Convert bearings to azimuths
- 5.9. Convert azimuths to reverse (back) azimuths
- 5.10. Convert bearings to reverse (back) bearings
- 5.11. Discuss open traverses and their applications
- 5.12. Discuss closed traverses and their applications
- 5.13. Differentiate between interior angles and deflection angles
- 5.14. Illustrate the purpose of Traverse stations and occupied points

Learning Objectives

- 5.a. Conduct distance measuring using a variety of equipment and techniques
- 5.b. Calculate and layout a provided design using variety of equipment and techniques
- 5.c. Comprehend the differences between Azimuth and Bearing
- 5.d. Comprehend Traverse Surveys and Computations

6. Work with different Coordinate Systems

Domain: Cognitive Level: Applying Status: Active

Assessment Strategies

- 6.1. Objective exam/quiz
- 6.2. Project

Criteria

Learners will be successful when they are able to:

- 6.1. Describe the multiple coordinate systems used for Geospatial representations
- 6.2. Demonstrate the ability to determine locations utilizing coordinates
- 6.3. List coordinate systems in order from least accurate to most accurate
- 6.4. Explain vertical and horizontal datum
- 6.5. Discuss the "datum shift" between NAD 27 and NAD 83
- 6.6. Describe the UTM, SPC, and county coordinate system
- 6.7. Convert coordinate between systems

Learning Objectives

- 6.a. Utilize Coordinate Systems and their important function for efficiently identifying locations on the earth's surface
- 6.b. Interpret the different projections of coordinate systems

7. Use GIS to research land data and present land data

Domain: Cognitive Level: Applying Status: Active

Assessment Strategies

- 7.1. Objective exam/quiz
- 7.2. Project

Criteria

Learners will be successful when they are able to:

- 7.1. Define GIS and the uses for Geomatics
- 7.2. Navigate various GIS websites to comprehend different approaches to GIS
- 7.3. Manipulate GIS to retrieve desired data and geographic information
- 7.4. Categorize different aspects of GIS (Mapping symbology, Data Management, Imagery, Spatial Analysis and sharing)

Learning Objectives

- 7.a. Discuss GIS and how it relates to Geomatics
- 7.b. Use ESRI Software

8. Describe how CAD is used for Geomatics

Domain: Cognitive Level: Understanding Status: Active

Assessment Strategies

- 8.1. Project

Criteria

Learners will be successful when they are able to:

- 8.1. Define CAD and the uses for Geomatics
- 8.2. Recognize the various types of CAD software that can be used in Geomatics (Autodesk suite, BricsCAD, Intellicad, Bentley, and Microstation)
- 8.3. Navigate basic functions in AutoCAD
- 8.4. Describe the differences between model space and paper space

Learning Objectives

- 8.a. Discuss CAD and how it relates to Geomatics
- 8.b. Use CAD Software

9. Follow the process for GNSS Surveying

Domain: Cognitive Level: Remembering Status: Active

Assessment Strategies

- 9.1. Objective exam/quiz
- 9.2. Project

Criteria

Learners will be successful when they are able to:

- 9.1. Recall the components necessary to obtain sub-centimeter accuracy using GNSS equipment (satellites, radios, antennas, control points and triangulation)
- 9.2. Explain the setup of data collectors to utilize WISCONSIN for calibration
- 9.3. Carryout basic data collection with iPad and how to utilize ESRI ArcGIS Field Maps
- 9.4. Convert data from ArcGIS shape files to CSV files and import to AutoCAD
- 9.5. Utilize AutoCAD for general clean up of data

Learning Objectives

- 9.a. Discuss the various components of GNSS Surveying
- 9.b. Apply process to utilize GNSS equipment