



FORT LEONARD WOOD, MO  
NONCOMMISSIONED OFFICERS ACADEMY  
SYLLABUS FOR 12Y30  
ADVANCED LEADER COURSE



# GEOSPATIAL ENGINEER ALC

## Purpose:

The 12Y30 Geospatial Engineer Advanced Leader Course is designed to develop Geospatial Engineers Non-Commission Officers to lead Soldiers who perform geospatial analysis in support of military and government operations. The 12Y30 Geospatial Engineer performs duties of preceding skill level, supervises lower grade Soldiers and provides technical guidance to Soldiers in the accomplishment of their duties. Supervise topographic analysts at division, Corps and EAC topographic units to include maintenance of assigned equipment. Evaluate source materials for military geographic information analysis. Supervise quality assurance during all stages of topographic operations to include finish compilation of geospatial data into printable map/products and printing of hardcopy geospatial information. Ensures required administrative, intelligence, source data and reference files are maintained. Advise command and staff officers on all aspects of topographic operations and doctrine.



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## Course Scope:

This course provides the knowledge and implementation of GIS to conduct military and environmental analysis in support of military and government applications.

## **Specific Learning Outcomes:**

- By the end of this course, students will:
- Assess the weather and climate in support of operations.
- Discuss the GIS Process and understand the fundamentals of GIS.
- Use advanced GIS editing tools to produce and analyze geographic data.
- Use Spatial Analysis tools to analyze Remote Sensed Imagery.
- Process and manipulate Remote Sensed and Hyperspectral Imagery.
- Produce 3-D Visualization Product.
- Write a formal paper that describes the terrain and its effects on military operations.
- Complete two (2) Analyses of the Area of Operation capstone exercises.

## **Format and Procedures:**

This course is a 535 hour course, which is completed in 14 weeks. A Computer lab-oriented course introduces the student to the realm, principles, and capabilities of geographic information systems (GIS). Lectures, discussions, and practical exercises are employed to develop understanding of and practically apply fundamental and advanced concepts of GIS. Emphasis is placed on military-based applications of GIS technology.



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## Course Prerequisites:

1. Security Clearance Required: Prior to October 2011, Soldier must meet SECRET security eligibility requirements to be awarded and maintain this MOS. Effective October 2011; the Soldier must meet **TOP SECRET (TS)** and **Sensitive Compartmented Information (SCI)** access eligibility requirements to be awarded and retain this MOS.
2. Language Requirements: A score of 75 on the English Proficiency Test is required.
3. Aptitude level: As established by the Office of Personnel Management Skilled Technical Score of 100.
4. Physical: As determined by the individual Service; normal color vision.
5. Obligated service requirement: As prescribed by the individual Service or Office of Personnel Management.
6. Other prerequisites: A visual stereoscopic acuity of 175 seconds of arc or less.



# **GEOSPATIAL ENGINEER**



**Security Clearance: *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)***

**Course Length–Weeks: 13      Days: 2      Hours: 535**

**Class Sizes – Optimum: 16    Min: 8    Max: 16**

## **Administrative Time:**

**Module: A / 001                      15.5**

**Title:    **Weather****

## **Academic Time:**

**Module: B / 001                      37.5**

**Title:    **Intermediate GIS Analysis****

**Module: C / 001                      40.0**

**Title:    **Data Production and Editing Techniques (DPET)****

**Module: D / 001                      73.0**

**Title:    **Spatial Analyst for GEOINT (SAGI)****



# GEOSPATIAL ENGINEER



## Academic Time:

**Module: E / 001                      59.5**

**Title:    Environment for Visualizing Images (ENVI)**

**Module: F / 001                      34.5**

**Title:    Terrain Visualization**

**Module: G / 001                      16**

**Title:    Military Writing for the Geospatial  
Engineer/MDMP**

**Module: H / 001                      72.0**

**Title:    Operational Analysis of the AAO (Production  
Phase)**

**Module: I / 001                      155.5**

**Title:    Tactical Analysis of the AAO (Production  
Phase)**

**Module: J / 001                      31.5**

**Title:    Administrative Hours**



# GEOSPATIAL ENGINEER



**Module:** A / 1

**Title:** Weather

**Purpose:** This module provides instructions on the relevance of weather effects on military operations. It also discusses how to comprehend the difference between weather and climate. It provides information about weather impacts on historical military operations. This module provides a detailed description on the effects of weather on different soils as well as the effects of solar and lunar illumination. The module concludes with an evaluation on conducting a weather brief with analysis of weather effects on military operations.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

15.5

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** Diagnostic Exam

**References:** 12Y30 A-010

**Lesson Title:** Entrance Exam Peer To Peer Classes

**References:** 12Y30 A-010-2

**Lesson Title:** Weather Effects On Terrain

**References:** 12Y30 H-010

**Lesson Title:** Daily Weather Briefing Overview

**References:** 12Y30 A-020

**Lesson Title:** Intro to Terrago Technologies

**References:** 12Y30 A-080



# GEOSPATIAL ENGINEER



**Module:** B / 1

**Title:** Intermediate GIS Analysis

**Purpose:** This module provides detailed instructions on how to apply the concepts associated with the fundamentals of GIS to include GIS data types, geodesy and map composition. This module also reviews the ArcGIS software and functions.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

37.5

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** Fundamental GIS Review

**References:** 12Y30 B-010

**Lesson Title:** Data Management

**References:** 12Y30 B-020

**Lesson Title:** Military Analyst

**References:** 12Y30 B-030

**Lesson Title:** Geocoding

**References:** 12Y30 B-040

**Lesson Title:** Geostatistical Analysis

**References:** 12Y30 B-050

**Lesson Title:** Utility Network Analysis

**References:** 12Y30 B-060

**Lesson Title:** Spatial Analysis

**References:** 12Y30 B-070

**Lesson Title:** 3D Analysis

**References:** 12Y30 B-080

**Lesson Title:** Demonstrate Modeling in ARCGIS

**References:** 12Y30 B-090

**Lesson Title:** B Block Review

**References:** 12Y30 B-090-2

**Lesson Title:** GIS for Analysis Capstone Exercise

**References:** 12Y30 B-100



# GEOSPATIAL ENGINEER



**Module:** C / 1

**Title:** Data Production and Editing Techniques (DPET)

**Purpose:** This module provides detailed instructions on how to create features visually and geometrically. It provides instructions on editing features with map topology and Geodatabase topology. The module concludes with an examination on Data Production and Editing Techniques.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

40

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** DPET Intro

**References:** 12Y30 C-010

**Lesson Title:** Importing And Loading Data

**References:** 12Y30 C-020

**Lesson Title:** Correcting Coordinate Systems

**References:** 12Y30 C-030

**Lesson Title:** Spatially Adjusting Features

**References:** 12Y30 C-040

**Lesson Title:** Data Loading Project

**References:** 12Y30 C-040 CE

**Lesson Title:** Creating Features Visually

**References:** 12Y30 C-050

**Lesson Title:** Creating Features Geometrically

**References:** 12Y30 C-060

**Lesson Title:** Editing Features

**References:** 12Y30 C-070

**Lesson Title:** Editing With Map Topology

**References:** 12Y30 C-080

**Lesson Title:** Creating Attributes

**References:** 12Y30 C-090

**Lesson Title:** Editing Attributes And Tables

**References:** 12Y30 C-100

**Lesson Title:** Find Attribute Errors And Edit Tables

**References:** 12Y30 C-040 CE

**Lesson Title:** Editing With Geodatabase Topology

**References:** 12Y30 C-120

**Lesson Title:** Data Maintenance Project

**References:** 12Y30 C-120-CE

**Lesson Title:** Creating Features With Coordinate GEO

**References:** 12Y30 C-140

**Lesson Title:** DPET Exam And Review

**References:** 12Y30 C-150



# GEOSPATIAL ENGINEER



**Module:** D / 1

**Title:** Spatial Analyst For GEOINT (SAGI)

**Purpose:** This module provides detailed instructions on recognizing raster coordinate systems and resolutions; recognizing raster cell coincidence and registration; employing raster resample; employing raster geo-referencing; recognizing raster cell values and attribute tables; recognizing raster zones, regions and various raster formats; employing raster analysis, geo-processing, and toolbar environments; model building and employing map algebra functions. The module concludes with an examination on Spatial Analyst for GEOINT utilizing only the Spatial Analyst Tools.

**Remarks:** None

## **Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

## **Hours**

73

## **Security Clearance:**

**TOP SECRET (TS)** and **Sensitive Compartmented Information (SCI)**

**Lesson Title:** Intro To Spatial Analyst

**References:** 12Y30 D-050

**Lesson Title:** Raster Concept Overview

**References:** 12Y30 D-060

**Lesson Title:** Read Chapters 9 & 10 GIS Fundamental

**References:** 12Y30 D-060-1

**Lesson Title:** Working With Rasters

**References:** 12Y30 D-070

**Lesson Title:** Intro To Map Algebra

**References:** 12Y30 D-080-1

**Lesson Title:** Map Algebra Functions

**References:** 12Y30 D-080-2

**Lesson Title:** Raster Processing Tools

**References:** 12Y30 D-090

**Lesson Title:** Interpolation Tools

**References:** 12Y30 D-100

**Lesson Title:** Surface Analysis Tools

**References:** 12Y30 D-110

**Lesson Title:** Distance Tools

**References:** 12Y30 D-120

**Lesson Title:** Spatial Modeling

**References:** 12Y30 D-130-1

**Lesson Title:** Model Builder

**References:** 12Y30 D-130-2

**Lesson Title:** Advanced Display Techniques

**References:** 12Y30 D-140

**Lesson Title:** IED Analysis 201

**References:** 12Y30 D-170

**Lesson Title:** Spatial Analysis For GEOINT Review

**References:** 12Y30 D-180

**Lesson Title:** Spatial Analysis For GEOINT Exam/Review

**References:** 12Y30 D-190



# GEOSPATIAL ENGINEER



**Module:** E / 1

**Title:** Environment For Visualizing Images (ENVI)

**Purpose:** This module provides detailed instructions on exploring the ENVI software. The exploration of the ENVI software includes processes and tools. These processes and tools include the mosaic and subset of imagery; map projections; the SPEAR tool; image enhancement; target detection; terrain classification. The module concludes with an examination on the basic comprehension of using ENVI, its tools and running processes through ENVI.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

59.5

**Security Clearance:**

**TOP SECRET (TS)** and **Sensitive Compartmented Information (SCI)**

**Lesson Title:** Exploring Envi Zoom

**References:** 12Y30 E-010

**Lesson Title:** Visual Exploration And Annotation

**References:** 12Y30 E-020

**Lesson Title:** Mosaic And Subset Imagery

**References:** 12Y30 E-030

**Lesson Title:** Map Projections

**References:** 12Y30 E-040

**Lesson Title:** SPEAR Tools

**References:** 12Y30 E-050

**Lesson Title:** Create & Use Topographic Products

**References:** 12Y30 E-060

**Lesson Title:** Feature Extraction With Rule Based CLS

**References:** 12Y30 E-070

**Lesson Title:** ARCGIS Interoerability

**References:** 12Y30 E-080

**Lesson Title:** ENVI NITF Module & LiDAR TDA

**References:** 12Y30 E-090

**Lesson Title:** Intro To Fund. Spec. Exploit & Analysis

**References:** 12Y30 E-100

**Lesson Title:** Remote Sensors Overview

**References:** 12Y30 E-110

**Lesson Title:** Prop. Of the EM Wave Inter. With Phy.Mat.

**References:** 12Y30 E-120

**Lesson Title:** Phenmenology Of The EM Spectrum

**References:** 12Y30 E-130

**Lesson Title:** TCPED

**References:** 12Y30 E-140

**Lesson Title:** E Block Pretest

**References:** 12Y30 E-140-1

**Lesson Title:** Intro to ENVI And ENVI Zoom

**References:** 12Y30 E-150

**Lesson Title:** Importing & Exporting Images With ENVI

**References:** 12Y30 E-160

**Lesson Title:** Reproject An Image

**References:** 12Y30 E-170

**Lesson Title:** Register An Image

**References:** 12Y30 E-180

**Lesson Title:** Enhancing Images Using ENVI

**References:** 12Y30 E-190

**Lesson Title:** Image Sharpening Using ENVI

**References:** 12Y30 E-190-1

**Lesson Title:** Target Detection

**References:** 12Y30 E-200

**Lesson Title:** Terrain Categorization Unsupervised

**References:** 12Y30 E-210

**Lesson Title:** SAN DIEGO

**References:** CP1

**Lesson Title:** Final Capstone Exercise

**References:** 12Y30 E-220

**Lesson Title:** E Block Exam Review

**References:** 12Y30 E-230



# GEOSPATIAL ENGINEER



**Module:** F / 1

**Title:** Terrain Visualization

**Purpose:** This module includes detailed instructions on the utilization of the TerraBuilder program. In this module students will create, edit and maintain a realistic 3D model of the earth. Students will combine data to create a 3D backdrop for overlays or other content that uses Terra Explorer. The module concludes with an evaluation on correctly producing a 3D elevation model with overlays.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

34.5

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** Intro To Skyline Terrasuite

**References:** 12Y30 F-020

**Lesson Title:** Intro To Terrabuilder Version 1.7

**References:** 12Y30 F-030

**Lesson Title:** Intro to Terra Explorer Pro

**References:** 12Y30 F-040

**Lesson Title:** Capstone Exercise

**References:** 12Y30 E-050



# GEOSPATIAL ENGINEER



**Module:** G / 1

**Title:** Military Writing for Geospatial Engineers/MDMP

**Purpose:** This module includes detailed information on the proper military writing style and the proper use of voice. This module also includes instruction over applying the geospatial engineer responsibilities in the Military Decision Making Process. The module is concluded with an evaluation on writing a Terrain Write-Up.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

16

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** Military Writing For Geospatial Engineers

**References:** 12Y30 G-040

**Lesson Title:** Analysis Of The Area Of Operations

**References:** 12Y30 G-050



# GEOSPATIAL ENGINEER



**Module:** H / 1

**Title:** Operational Analysis Of The AAO (Production Phase)

**Purpose:** This module is about applying geospatial engineer skill sets learned throughout the 12Y30 course. Students will conduct operational analysis of the AAO in a scenario based format. Students will produce several tactical decisions aids (TDA's) to display their analysis. Students will brief the analysis they have conducted within the Operational Analysis scenario.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

72

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** Operational Analysis Of The AAO

**References:** 12Y30 H

**Lesson Title:** Operational Brief

**References:** 12Y30 H



# GEOSPATIAL ENGINEER



**Module:** 1 / 1

**Title:** Tactical Analysis Of The AAO (Production Phase)

**Purpose:** This module is about applying geospatial engineer skill sets learned throughout the 12Y30 course. Students will conduct tactical analysis of the AAO in a scenario based format. Students will produce several tactical decisions aids (TDA's) to display their analysis. Students will brief the analysis they have conducted within the Tactical Analysis scenario.

**Remarks:** None

**Technique(s) of Delivery:**

Small Group Instruction (SGI) (SG)

**Hours**

155.5

**Security Clearance:** *TOP SECRET (TS)* and *Sensitive Compartmented Information (SCI)*

**Lesson Title:** Tactical I Analysis Of The AAO

**References:** 12Y30 I

**Lesson Title:** Tactical Brief

**References:** 12Y30 I



# **TECHNICAL ENGINEER SUPERVISOR**



## **Written Examinations**

**Data Production And Editing Techniques (DPET)**

**Spatial Analyst For GEOINT (SAGI)**

**Environment For Visualizing Images (ENVI)**

**Operational Analysis Of The AAO Brief**

**Tactical Analysis Of The AAO Brief**

## **Evaluations**

**APFT**

**PRT Instruction**

**In Ranks Inspection**

**Weather Brief (2)**

**Student Led Discussion (OE)**

**3D Terrain Fly-Through Brief**

**Leadership in Garrison Environment**

**APA Essay**

**Terrain Write-Up (2)**