GPC-AS II

Essential Body of Work & Knowledge (EBW/EBK)
GEOINT Professional Certification - Applied Sciences: Proficiency Level II
16 March 2017 (current version can be found at http://gpc.nga.ic.gov)

Core Competency 1 - Cartography (9%)

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 1: Comprehend Cartographic Principles

ECO 1.1: Define Cartography
ECO 1.2: Discuss the importance of map projections and uses, such as the projection for a specific area of the world, analytical process and cartographic products
ECO 1.3: Name the three surfaces used in projection data
ECO 1.4: Identify the purpose and problems associated with projecting data
ECO 1.5: Describe the properties of maps that are preserved with each type of projection
ECO 1.6: Define Scale and the terms large scale, medium scale, and small Scale and explain their common uses
ECO 1.7: Define Meridians and Parallels
ECO 1.8: Explain the difference between a chart and a map
ECO 1.9: Discuss the importance of geodetic principles in mapping

TCO 2: Comprehend Various Grid Systems

ECO 2.1: Describe the importance and uses of grid systems

Core Competency 2 - Coordinate System Analysis (6%)

Analyzes datum, coordinate, and grid systems, computes datum transformation parameters, and validates geodetic information on GEOINT products. Computes datum shifts to convert information between local datums, grid systems, and WGS 84. (Subdirectory, July 2010, KSA: Skill in analyzing datum, coordinate, and grid systems, computing datum transformation parameters, and validating geodetic information on NGA products, Skill in computing datum shifts to convert information between local datums, grid systems, and WGS 84, Knowledge of Datum Transformation Procedures, Knowledge of Grids, Projections, Datum, Coordinates, Knowledge of World Geodetic System (WGS))

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 3: Apply Various Coordinate Systems

ECO 3.1: Define coordinate system
ECO 3.2: Knowledge between various coordinate systems (Geodetic, Cartesian,MGRS,UTM,USNG,GARS)
ECO 3.3: Describe the purpose of the GEOTRANS software
ECO 3.4: Identify of the difference between UTM and MGRS Coordinates

Core Competency 3 - GIS Based Analysis (7%)

Utilizes GIS applications for mission planning, geo-positional data display, reconnaissance, and proximity analysis. Renders astronomical, geodetic, and geophysical data using GIS display and performs static, dynamic, and predictive analysis on data. Uses GIS in data validation, geodetic and geophysical modeling bathymetric and hydrographic information to answer questions for military, defense systems interest to the IC and NSG.

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 4: Apply GIS Principles

ECO 4.1: Apply GIS gridding methods and spatial propagation methods
ECO 4.2: Apply GIS Mathematics and Statistics to GEOINT
ECO 4.3: Apply spatial data conversions to GEOINT

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Core Competency 4 - Information Security (6%)

Applies knowledge of policies, procedures, and requirements established under appropriate authorities to protect information that, if subjected to unauthorized disclosure, could reasonably be expected to cause damage to national security. (Subdirectory, July 2010, KSA: Knowledge of Release and Disclosure Policies)

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 5: Apply Knowledge of Information Security

ECO 5.1: Define Proprietary information and state who may receive proprietary Information Derivative Classification Information

ECO 5.2: Apply Classification of models created from data at multiple classification levels, data handling, and determination of classification level

Core Competency 5 - Mathematics (15%)

Knowledge of Calculus, Knowledge of Linear Algebra.

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 6: Apply Fundamentals of Basic Trigonometry

ECO 6.1: Name the 6 trigonometric functions

ECO 6.2: Convert angular measurement to radians

TCO 7: Comprehend Fundamentals of Spherical Trigonometry

ECO 7.1: Explain the difference between Spherical and planar Trigonometry

ECO 7.2: Explain the use of spherical trigonometry in Applied Sciences

TCO 8: Comprehend Fundamentals of Vector Analysis

ECO 8.1: Define vector and scalar

TCO 9: Know Fundamentals of Matrix / Linear Algebra and their applications to Geodetic and Bathymetric Data

ECO 9.1: Define matrix, matrix addition, multiplication, transpose, and list conditions for it to be invertible

ECO 9.2: State applications of matrices in processing Geodetic and Bathymetric data

TCO 10: Apply derivatives and partial derivatives and their importance in the application of Geodetic and Bathymetric Data

ECO 10.1: Define the derivative and partial derivatives and their significance Geodetic and Bathymetric information.

Core Competency 6 - Statistical Analysis (15%)

Identifies and applies appropriate statistical tools and techniques to examine data, draw conclusions or insights, and determine trends. (Subdirectory, July 2010, KSA: Skill in examining data using appropriate statistical techniques to draw conclusions or insights and determine trends, Knowledge of Error Propagation Theory, Knowledge of Statistical Concepts and Techniques)

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 11: Comprehend Fundamentals of Statistics and their applications to Geodetic and Bathymetric Data

ECO 11.1: Define Descriptive Statistics (mean, median, mode, range, variance and standard deviation)

ECO 11.2: State applications of Statistics to Geodetic and Bathymetric Data

TCO 12: Comprehend Fundamentals of Least Square Adjustments and their applications to Geodetic and Bathymetric Data

ECO 12.1: Define Least Square Curve fitting and residual values

ECO 12.2: Name types of Errors

ECO 12.3: Explain applications of Least Square Adjustments to Geodetic and Bathymetric Data

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Core Competency 7 -Tools and Methods (42%)

Applies tools and methods to substantive discipline, domain, or area of work. Adapts existing tools or methods or employs new methodological approaches required for substantive discipline, domain, or area of work.

Terminal and Enabling Certification Objectives (TCOs & ECOs)

TCO 13: Comprehend Geodetic Fundamental Principles
ECO 13.1: Name three different types of Latitude used in Geodesy
ECO 13.2: Define a Geodesic Curve
ECO 13.3: State the four defining parameters of WGS84
ECO 13.4:Describe the impacts of datum mismatches, datum complexities and datum transformations
ECO 13.5:Describe the three fundamental surfaces used in Geodesy
TCO 14: Comprehend Geodetic Surveying Principles
ECO 14.1: Describe Geodetic Surveying
ECO 14.2: Describe Horizontal and Vertical Control
ECO 14.3: Explain the difference between horizontal and vertical surveying
ECO 14.4: Describe Astronomic, Triangulation, Trilateration, and Traverse Surveying
ECO 14.5: Describe the physical principles of gravity surveying
ECO 14.6: Name instruments that are used in measuring gravity
ECO 14.7: Name and define vertical surveying techniques
ECO 14.8: Define Astronomic Latitude and Longitude
ECO 14.9: Explain how to triangulate survey sites using conventional surveying equipment
ECO 14.10: Explain how to pre-test survey instruments to ensure proper reading and adjustments prior to deployment.
TCO 15: Comprehends Physical Geodesy Principles
ECO 15.1: Describe Gravity
ECO 15.2: Define different types of Gravity Anomalies
ECO 15.3: Describe gravimetric analysis and modeling
ECO 15.4: Explain the cause of variations in the Earth's gravity Field
ECO 15.5: Describe how gravity effects various weapon and navigation systems
ECO 15.6: Name the types of gravity measurements.
ECO 15.7: Describe gravity theory
ECO 15.8: Describe gravity potential and acceleration
ECO 15.9: Define an equipotential surface
ECO 15.10: Define the Geoid
ECO 15.11: Describe vertical deflection and its importance to NGA and its partners

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TCO 16: Comprehend Satellite Geodesy Principles
ECO 16.1: Define Satellite Geodesy and its applications to GEOINT
ECO 16.2: Describe the technique and purpose of satellite altimetry
ECO 16.3: Explain how Satellite Altimetry data can be converted to gravity values.
TCO 17: Comprehend Geotechnical Principles
ECO 17.1: Describe paleo-climate, climate and meteorological factors influencing geotechnical analysis
ECO 17.2: Describe Vadose zone mechanics
ECO 17.3: Describe aeolian processes
ECO 17.4: Describe coastal processes
ECO 17.5: Describe fluvial hydrology
ECO 17.6: Describe the processes influencing natural hazards
ECO 17.7: Describe the basic processes in geochemical modeling
TCO 18: Apply Bathymetric Principles
ECO 18.1: Define Bathymetry and Hydrography
ECO 18.2: Describe the four marine surveying techniques, their purposes and when they should be updated
ECO 18.3: Describe the two major causes of tides and tidal datums
ECO 18.4: Demonstrate knowledge of Bathymetric data sources and international standards
ECO 18.5: Describe Lidar techniques (multi-beam and single-beam)
ECO 18.6: Demonstrate knowledge of data correction requirements and common corrections to maritime surveys
ECO 18.7: Describe tides and tidal datum and terms that effect global tides
ECO 18.8: Apply Bathymetry to NGA products
ECO 18.9: State the sources for producing hydrographic surveys, charts, and other reports
TCO 19: Comprehend Orbital Mechanics and GPS Principles
ECO 19.1: Describe orbital motion and the fundamentals of orbital mechanics
ECO 19.2: Describe the orbital effects on ground tracks
ECO 19.3: Describe satellite perturbation
ECO 19.4: Describe the principles of orbital maneuvering
ECO 19.5: Explain NGA's role in GPS operations.
ECO 19.6: Describe the methods used to estimate orbits for GPS and other systems
ECO 19.7: Explain how GPS computes a position and vECOcity on the ground.
ECO 19.8: Explain how to compare modeled or known digital signals to identify signatures of interest
ECO 19.9: Explain how to analyze GPS satellite data for best satellite and station clock solution, anomaly detection, and ephemeris production
ECO 19.10: Define Earth Orientation Parameters and determine Earth orientation parameters and predictions
ECO 19.11: State factors used to analyze monitor station performance, communications, and data flow.
ECO 19.12: Define JLOC and its purpose