

Geomatics (GEO)

Courses

GEO A146 Geomatics Computations 3 Credits

Introduces geomatic principles and methods of computation related to Cartesian coordinate systems, coordinate geometry, subdivision and area. Examines computations of circular, spiral and vertical curves. Covers computational methods using a current industry-standard handheld calculator and computer programming techniques for geomatics.

Prerequisites: GEO A156 with a minimum grade of C or concurrent enrollment and (MATH A151 with a minimum grade of C or concurrent enrollment or MATH A152 with a minimum grade of C or concurrent enrollment or MATH A155 with a minimum grade of C or concurrent enrollment or MATH A211 with a minimum grade of C or concurrent enrollment or MATH A212 with a minimum grade of C or concurrent enrollment or MATH A221 with a minimum grade of C or concurrent enrollment or MATH A251 with a minimum grade of C or concurrent enrollment or MATH A251F with a minimum grade of C or concurrent enrollment or MATH A252 with a minimum grade of C or concurrent enrollment or MATH A252F with a minimum grade of C or concurrent enrollment or MATH A253 with a minimum grade of C or concurrent enrollment).

GEO A155 Introduction to Surveying 3 Credits

Introduces field surveying theory and techniques for non-geomatics majors. Subject areas include distance measurement, leveling, angular measurements, volume measurement, basic traversing, measurement adjustments, fundamentals of mapping, geographic information systems and use and care of surveying instruments.

Prerequisites: ES A106 with a minimum grade of C or concurrent enrollment.

Corequisites: GEO A155L.

GEO A156 Geospatial Measurement I 2 Credits

Introduces fundamentals of geospatial plane measurements. Subject areas include theory of errors in observations, leveling theory, distance measurements, angular measurements, traversing, traverse adjustments, contouring, fundamentals of mapping, and typical instruments used for measurement.

Prerequisites: MATH A151 with a minimum grade of C or concurrent enrollment or MATH A152 with a minimum grade of C or concurrent enrollment or MATH A155 with a minimum grade of C or concurrent enrollment or MATH A211 with a minimum grade of C or concurrent enrollment or MATH A212 with a minimum grade of C or concurrent enrollment or MATH A221 with a minimum grade of C or concurrent enrollment or MATH A251 with a minimum grade of C or concurrent enrollment or MATH A251F with a minimum grade of C or concurrent enrollment or MATH A252 with a minimum grade of C or concurrent enrollment or MATH A252F with a minimum grade of C or concurrent enrollment or MATH A253 with a minimum grade of C or concurrent enrollment.

GEO A156L Geospatial Measurement I Laboratory 1 Credit

Laboratory skills in geospatial plane measurement. Subject areas include field applications of leveling, distance measurements, angular measurements, traversing, traverse adjustments, and location of physical features using conventional surveying instruments.

Prerequisites: GEO A156 with a minimum grade of C or concurrent enrollment.

GEO A157 Computer-Aided Drafting for Surveyors 3 Credits

Introduction to the knowledge and skills necessary to create maps and plats using computer-aided drafting. Topics of study include basic drafting principles, drawing setup and scale, drawing commands, digital terrain modeling, and mapping standards and accuracies.

Prerequisites: GEO A156 with a minimum grade of C.

GEO A181 Construction Surveying 1 Credit

Covers basic construction surveying procedures including staking for roads, buildings and excavations, use of maps, construction plans, datums and co-ordinate systems, and machine control systems.

Special Note: The course is predominantly field work.

Prerequisites: MATH A105 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C.

GEO A246 Geomatics Computations II 3 Credits

Covers computational methods and computer programming techniques for geomatics.

Prerequisites: GEO A146 with a minimum grade of C and (MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C).

GEO A256 Engineering Surveying 2 Credits

Covers the theory of engineering surveying including, construction applications, setting out of structures, route surveying, geometric design of horizontal and vertical curves, earthwork computations, utility location and hydrography.

Prerequisites: GEO A266 with a minimum grade of C or concurrent enrollment.

GEO A256L Engineering Surveying Laboratory 1 Credit

Laboratory skills in engineering surveying, including construction applications, setting out of structures, route surveying, geometric design of horizontal and vertical curves, earthwork computations, utility location and hydrography.

Prerequisites: GEO A256 with a minimum grade of C or concurrent enrollment and GEO A266 with a minimum grade of C or concurrent enrollment and GEO A266L with a minimum grade of C or concurrent enrollment.

GEO A266 Geospatial Measurement II 2 Credits

Examines advanced geospatial measurement techniques using conventional survey instruments and GPS. Theoretical concepts of control surveys, leveling, adjustment of survey data and data collection is provided through topographic surveying projects. Introduces field-to-finish mapping and processing of electronic field records.

Prerequisites: GEO A156 with a minimum grade of C and GEO A156L with a minimum grade of C.

GEO A266L Geospatial Measurement II Laboratory 1 Credit

Laboratory skills in advanced geospatial measurement techniques using conventional survey instruments and GPS. Practical application of control surveys, leveling, adjustment of survey data and data collection is provided through topographic surveying projects. Examines field techniques used in field-to-finish mapping and processing of electronic field records.

Prerequisites: GEO A266 with a minimum grade of C or concurrent enrollment.

GEO A267 Boundary Law I 3 Credits

Presents elements of boundary control and legal principles. Course topics include boundary history, ownership, rights, interests, title, transfer, description of real property, the rectangular system, sequential conveyances, simultaneously created boundaries and water boundary elements.

Prerequisites: WRTG A211 with a minimum grade of C or WRTG A212 with a minimum grade of C or WRTG A213 with a minimum grade of C or WRTG A214 with a minimum grade of C or WRTG A2W with a minimum grade of C and GEO A156 with a minimum grade of C.

GEO A357 Photogrammetry 3 Credits

Introduces principles of optics, image formation, and lens distortions. Introduces geometry of photographs acquired by terrestrial and aerial cameras. Outlines basic geometric and mathematical concepts used in analytical photogrammetry. Illustrates methods of image acquisition, stereoscopic measurements, and 3D model reconstruction in terrestrial and aerial photogrammetry. Develops the student's ability to use photogrammetric techniques within the framework of Geomatics, including the use of industry-standard photogrammetric software.

Prerequisites: GEO A146 with a minimum grade of C and GIS A351 with a minimum grade of C.

GEO A359 Geodesy and Map Projections 3 Credits

Introduces geometrical and physical geodesy. Examines computations on the ellipsoid, elements of datums, map projections and state plane coordinate systems.

Prerequisites: GEO A146 with a minimum grade of C.

GEO A364 Spatial Data Adjustments 3 Credits

Examines fundamental concepts of statistical error analysis with applications to surveying measurements. Covers fundamental properties of data sets, including measures of central tendency, measures of data variation, sampling distribution theory, statistical confidence intervals and testing, and propagation of variance. Covers theory and applications of least squares adjustment.

Prerequisites: GEO A146 with a minimum grade of C and STAT A253 with a minimum grade of C and MATH A314 with a minimum grade of C.

GEO A366 Spatial Data Adjustments II 3 Credits

Presents the theory and mechanics of least squares adjustment using the traditional surveying observations of distances, angles, azimuths and elevation differences. Covers post-adjustment analysis through the use of various statistical tests and error ellipse computation and analysis.

Examines least squares adjustment and analysis of differential leveling, triangulations, trilateration, traverse and network observations.

Prerequisites: GEO A364 with a minimum grade of C.

GEO A369 Cadastral Surveys 1 Credit

Discusses the United States Public Land Survey System with emphasis on Alaska: sectionalized land subdivision, corner restoration, resurveys, evidence, sources for legal research, and current BLM procedures and regulations.

Prerequisites: GEO A267 with a minimum grade of C.

GEO A410 High-Density Surveying 3 Credits

Introduces principles of high-density surveying, outlines theory and practice of collection and processing of high-density spatial data (point clouds). Covers the use of automated photogrammetric and structure from motion (SFM) techniques, airborne LiDAR, terrestrial and mobile laser scanners.

Prerequisites: GEO A357 with a minimum grade of C and GEO A364 with a minimum grade of C.

GEO A420 Point Cloud Analysis 3 Credits

Introduces principles of point cloud data analysis for geospatial applications. Outlines theory and practice of processing of point clouds generated from automated photogrammetric and structure from motion (SFM) techniques, airborne LiDAR, terrestrial and mobile laser scanners. Covers theoretical and practical aspects of high-density spatial data analysis including classification of LiDAR data, point cloud fusion, surface generation, shape fitting, and feature extraction.

Prerequisites: GEO A410 with a minimum grade of C.

GEO A433 Hydrographic Surveying 3 Credits

Provides students with knowledge of and skills to apply physical principles, instrumentation, data analysis methods, and visualization techniques associated with hydrographic surveying, chart publication, and related marine measurement practices of government and industry.

Prerequisites: GEO A266 with a minimum grade of C or concurrent enrollment.

GEO A457 Boundary Law II 3 Credits

Covers Alaskan survey history and case law, Alaska statutes and administrative code, writing legal descriptions, and the standards of practice for surveying in Alaska.

Prerequisites: GEO A369 with a minimum grade of C.

GEO A460 Geomatics Capstone Project 3 Credits

Utilizes techniques of research, design, data compilation, analysis and mapping learned throughout the geomatics curriculum to complete a geomatics capstone project. Addresses professional standards and ethical concerns for geomatics professionals.

Registration Restrictions: Senior standing and admission to the Bachelor of Science in Geomatics

Attributes: UAA Integrative Capstone GER.

GEO A466 Geopositioning 2 Credits

Introduces the theory of global navigation satellite systems (GNSS), primarily the global positioning system (GPS). Examines GNSS methodologies, solution types, biases, quality assessment, analysis and adjustment.

Prerequisites: GEO A359 with a minimum grade of C and GEO A364 with a minimum grade of C.

GEO A466L Geopositioning Laboratory 1 Credit

Laboratory practice of global navigation satellite systems (GNSS), primarily the global positioning system (GPS). Examines data collection, quality assessment, analysis and adjustment.

Prerequisites: GEO A466 with a minimum grade of C or concurrent enrollment.

GEO A490 Selected Advanced Topics in Geomatics 1-3 Credits

Explores advanced theoretical or practical concepts in geomatics. Specific course content is determined according to student needs, developments in technology or licensing requirements.

Special Note: May be repeated for a maximum of 12 credits with a change of subtitle.

Prerequisites: GEO A146 with a minimum grade of C and GIS A201 with a minimum grade of C.

GEO A698 Project 3 Credits

Arranges an individualized project in an area of geomatics as related to the profession. The graduate committee must approve the project topic.

Special Note: May be repeated once for credit.

Registration Restrictions: Graduate standing and instructor approval

GEO A699 Thesis 1-6 Credits

Engages student in individual study of an advanced geomatics problem resulting in a thesis.

Special Note: May be repeated for a maximum of 6 credits.

Registration Restrictions: Graduate standing and instructor approval