Land Surveying (SURV)

SURV 1020
Introduction to Geomatics
1:1:0 Fall
Orientation to the field of Geomatics including Boundary Surveying, Geodesy, Forensic Surveying, Construction Surveying, Geographic Information Systems (GIS), and other types of surveys. Involves presentations by community/industry professionals encompassing the Geomatics occupation. Teaches college success principles and practices for the Geomatics program. Lab access fee of $35 for computers applies.

SURV 2010
Land and Survey History
3:3:0 Fall
* Prerequisite(s): HIST 1740 or HIST 1700 or departmental approval and matriculation into the Geomatics BS degree
Explores the field of Geomatics and Surveying through the writings of Egyptian, Greek, Roman, European, English, and American surveyors and historians. Discusses how, what, and why these surveyors did what they did and how their contributions impacted the current practice of surveying, including the shaping of private land ownership and the development of the structure of our nation. Presents Utah land history including, the rectangular system, pioneer city plats, and other important surveys of Utah such as territorial, state, and Spanish and Mexican Grant boundaries. Lab access fee of $35 for computers applies.

SURV 2030
Geodesy
3:3:0 Fall
* Prerequisite(s): EGDT 2400, MATH 1060, MATH 1100, SURV 1020, and matriculation into the Geomatics BS degree
Examines the science of geodesy. Includes size and shape of the earth, spherical and ellipsoidal geometry, the celestial sphere, and astronomical trigonometry. Involves Global Positioning Systems theory for computing of position on the earth using three-dimensional coordinate systems, reference coordinate systems, state plane coordinates, transformations, spheroid, ellipsoid, geoid datums, celestial sphere, orthometric heights and leveling. Covers basic properties and characteristics of the most common map projections with emphasis on the projections used in State Plane Coordinates such as Lambert Conformal, Universal Transverse Mercator (UTM). Exposes the student to survey applications of practical astronomy including time systems, astronomical azimuth, and Solar/ Polaris observations and calculations.

SURV 2210
Photogrammetry
3:3:0 Fall
* Prerequisite(s): EGDT 1400, (MATH 1050 or MATH 1055), and matriculation into the Geomatics BS degree
Examines principals of photogrammetry as applied to surveying and mapping. Covers geometry of vertical and aerial photographs, stereoscopic parallax, geometry of tilted photographs, stereoplotter mapping, close-range photographic analysis, planimetric and topographic maps, flight planning, digital photogrammetry, aerial cameras and camera calibration, and the theory and techniques of orientation. Introduces digital imagery, aerial triangulation, and the history of photogrammetry. Software fee of $18 applies. Lab access fee of $35 for computers applies.

SURV 2220
Remote Sensing
3:3:0 Spring
* Prerequisite(s): MAT 1010 and matriculation into the Geomatics BS degree

SURV 2310
Surveying US Public Lands
3:3:0 Fall
* Prerequisite(s): EGDT 1400, MATH 1060, and matriculation into the Geomatics BS degree
Studies U.S. Public Land Survey System (PLSS) as described in the current official Department of the Interior-Bureau of Land Management (BLM) Manual of Instructions for Surveying Public Lands with emphasis on federal, state, and other applicable laws, evidence, resurveys, and subdivision of sections. Covers a detailed study of subsections, lost and obliterated corners, single and double proportion methods, monumentation, riparian boundary laws and rights, hiatuses, mineral surveys, and official survey documents. Introduces Spanish and Mexican land grants, as well as state and national boundaries. Lab access fee of $35 for computers applies.

SURV 2320
Property Descriptions and Public Land Records
3:3:0 Fall
* Prerequisite(s): ENGL 1010, EGDT 1400, and matriculation into the Geomatics BS degree
Involves analysis, interpretation, and writing of legal descriptions with proper form, controlling elements, metes-and-bounds, sectionalized land descriptions, easements, and rights-of-way. Discusses different types of descriptions, junior-senior rights in descriptions, latent & patent ambiguities, basis of bearing and interpretation, easements, and reversions. Applies practical exercises and case studies. Studies the responsibilities of the professional land surveyor regarding due diligence in searching public land records and performing applicable legal research. Examines public records and recording laws. Emphasizes title search to patent and includes zoning laws relating to land. Involves tour(s) of local record systems and/or public offices.

SURV 3010
Measurement Analysis and Adjustments
4:4:0 Spring
* Prerequisite(s): EGDT 2400, MATH 1060, MATH 1100, STAT 2040, matriculation into the Geomatics BS degree, and University Advanced Standing
Examines observation theory, and observational error analysis. Discusses the theory of measurement errors, principles of error propagation, variance and covariance, and the theory of the least squares method. Studies variances and co-variances of observed, derived, and adjusted quantities; regression analysis, and polynomial curve fitting. Involves systems of linear equations, linearization, and iteration of nonlinear equations; adjustment validation using hypothesis testing; modeling of surveying problems using different techniques of least squares and also presents several methods used to fit survey data to mathematical and survey models. Software fee of $18 applies. Lab access fee of $35 for computers applies.

SURV 3030
Land Development Planning, Platting, and Mapping
3:3:0 Spring
* Prerequisite(s): EGDT 1040, EGDT 1400, matriculation into the Geomatics BS degree, and University Advanced Standing
Discusses land use planning techniques for residential and commercial developments. Subdivisions, industrial parks, and commercial complexes are studied along with the associated governmental regulations, codes, rules, and approval processes and procedures. Requires a mock public presentation on course projects. Uses current surveying/engineering software to develop and plot drawings including; subdivision plats, records of survey, ALTA surveys, topographic site surveys, and other maps. Software fee of $18 applies. Lab access fee of $35 for computers applies.
Land Surveying

SURV 3220
Control Surveys
3:3:0  Fall
* Prerequisite(s): SURV 2030, SURV 3010, matriculation into the Geomatics BS degree, and University Advanced Standing
Applies principles and theories presented in prerequisite courses and moves the student to an advanced applications level. Studies the establishment of control surveys and survey networks. Reviews compass rule adjustment computation, matrix methods and least squares adjustment methods, random and systemic errors in measuring, and error propagation. Offers field applications of Radial and GPS surveying systems: static, kinematic and RTK procedures, data collection, post processing coordinate transformation, creation, and report generation. Teaches practical applications of network adjustment, control surveys, triangulation, and precision traverses with precise elevation control. Requires demonstration of field skills and techniques. Software fee of $18 applies. Lab access fee of $35 for computers applies.

SURV 3230
Construction and Route Surveys
3:3:0  Spring
* Prerequisite(s): EGDT 2400 and MATH 1060 or EGDT 1610, matriculation into the Geomatics BS degree OR department approval, and University Advanced Standing.
Applies principles and theories presented in prerequisite courses and moves the student to an advanced field applications level. Develops computations and practical applications covering Route and Construction surveys. Includes computer solutions and applications from plans and specifications using modern data collection and coordinate geometry (COGO) computer software. $35 course fee for computers, and $18 course fee for software applies.

SURV 3340
Boundary Law
3:3:0  Spring
* Prerequisite(s): Matriculation into the Geomatics BS degree required and University Advanced Standing
Studies the responsibilities of the land boundary surveyor in protecting rights, title, and interest of the land; riparian and littoral rights, bona-fide rights, boundary easements and reversions, conveyances; sequential and simultaneous. Presents principles and rules of evidence. Includes monuments and monumentation, boundary locations, and procedures used to establish new boundaries and locate existing boundaries. Lab access fee of $35 for computers applies.

SURV 3400
Surveying Applications and Field Techniques III
3:2:3  Fall
* Prerequisite(s): EGDT 2400, GIS 3600, and University Advanced Standing
Focuses on specific surveying applications and field survey techniques employed by surveyors on various field and office tasks including horizontal and vertical networks and traverses, route surveys, and topographic/site surveys, and machine control methods. Teaches the construction, care, maintenance, calibration, effective setup and observation methods used for; global positioning systems (GPS), total robotic stations, 3D laser scanners, automatic levels, modern data collectors, coordinate geometry (COGO) and computer-aided drafting (CAD) software and other geospatial surveying systems and instruments. Lab access fee of $35 applies. Software fee of $25 applies.

SURV 4340
Surveying Legal Principles
3:3:0  Spring
* Prerequisite(s): SURV 2320, SURV 3340, ENGL 2310, matriculation into the Geomatics BS degree, and University Advanced Standing
Focuses on researching the body of law as it applies to the practice of surveying. Covers common law associated with the Statute of Frauds, Constructive Notice, and Surveyor/Attorney interaction and roles. Discusses principles and concepts of dispute and conflict resolution as well as the specific role of the expert witness. Reviews the fact finder role of the surveyor in research/investigation techniques and sources while focusing on facts of a case and the applicable laws. Completers will work on case studies and prepare a final legal research paper. Involves tour(s) of a law library.

SURV 4400
Surveying Applications and Field Techniques IV
3:2:3  On Sufficient Demand
* Prerequisite(s): SURV 3400 and University Advanced Standing
Focuses on projects both lab/office and field work. Uses a mentor based teaching model to engage in several projects from inception to final deliverables. Requires students to make project decisions individually and as a team regarding each aspect of the various assigned projects. Requires each team member to demonstrate their own ability to perform all tasks required to complete the assigned projects within a given time frame resulting in deliverables that meet a pre-professional level of competency. Lab access fee of $35 applies. Software fee of $25 applies.

SURV 4500
The Surveying Practice
3:3:0  Spring
* Prerequisite(s): LEGL 3000, Department Approval, matriculation into the Geomatics BS degree, and University Advanced Standing
Examines the planning, organizing, and application of field and office practices, and develops a practical business plan including policies and procedures associated with a typical professional surveying firm providing surveying services to the public and private sector. Reviews and applies a myriad management principles and functions including: operations, financial, marketing, human resource, project, and risk management. Exposes the student to the functions of typical financial software. Explores business concepts specific to surveying; pricing, fees, bidding, proposals, contracts, and professional liabilities. Involves developing a business plan for a professional surveying firm. Lab access fee of $35 for computers applies.

SURV 451R
Geomatics Lecture Series
.5 to 1:5 to 1:0  Fall, Spring
* Prerequisite(s): Department Chair Approval, matriculation into the Geomatics BS degree, and University Advanced Standing
Consists of lectures presented by guest speakers or faculty on various topics in Geomatics including but not limited to: land surveying, mapping, remote sensing, geodesy, legal issues, photogrammetry, and various new and emerging technologies. May be repeated for a maximum of 1 credit toward graduation.

SURV 455G
Global Professional Ethics and Liabilities
3:3:0  Fall
* Prerequisite(s): PHIL 2050, LEGL 3000, departmental approval, matriculation into the Geomatics BS degree, and University Advanced Standing
Teaches the code of ethics adopted by the Utah Council of Land Surveyors (UCLS). Explains meaning and attributes of professionalism along with the ethical, moral, and social responsibilities of surveyors. Integrate laws for practicing surveying with professional ethics as well as the roles of multiculturalism and globalization. Includes model standards (international, national, and state), professional survey liability cases, safety, risks, professional client relationships, bribery, global engagement, contracts, and intellectual property. Involves lecture, readings, case studies, and other media.
SURV 481R
Geomatics Internship
1 to 8:0:5 to 40 On Sufficient Demand
* Prerequisite(s): Junior or Senior Standing, departmental written approval, matriculation into the Geomatics BS degree, and University Advanced Standing

Provides opportunities to apply classroom theory and principles to actual on-the-job work experience, on a paid or non-paid basis, in the field of Geomatics. Emphasizes the establishment of goals, learning objectives, and expected outcomes with their Faculty Sponsor at the beginning of the internship and/or semester. Involves the submittal of a comprehensive written report at the end of the semester consisting of an evaluation of original goals and objectives and reflects on the achieved outcomes gained from the work experience. May be repeated for a maximum of 8 credits toward graduation. May be graded credit/no credit.

SURV 490R
Professional Topics in Geomatics
3 to 4:2 to 4 On Sufficient Demand
* Prerequisite(s): Department Chair Approval, matriculation into the Geomatics BS degree, and University Advanced Standing

Studies a chosen topic in Geomatics. The topic may vary depending on demand. May include research, experimentation, analysis, and reporting. May be taken more than once for different topics and for a maximum of 8 credits toward graduation.

SURV 4930
Senior Geomatics Capstone
4:4:0 Spring
* Prerequisite(s): University Advanced Standing, Senior Standing, and Departmental Approval

Provides an opportunity for a senior Geomatics student to participate in a significant and current research project which will advance the field of Geomatics. Includes independent study and laboratory/field work as necessary and must be approved and supervised by an assigned faculty mentor. Culminates in the preparation of a written paper and oral presentation describing the results of the research and/or completed project to project stakeholders, interested students, faculty, administration, the professional Geomatics community, and the broader general audience. Lab access fee of $35 applies. Software fee of $25 applies.