LAND SURVEYING/GEOMATICS-BAS

Program Overview

Bachelor of Applied Science - Land Surveying/Geomatics

Graduates with a BAS with an emphasis in land surveying/ geomatics will be able to:

- Proficiently apply sound measurement methods, mathematics, science, and surveying tools to collect, analyze, and edit spatial information in professional applications.
- Develop a sound background in the humanities, social sciences, and the arts to function in multicultural and diverse environments.
- Demonstrate fundamentals in business management and understand business environments and decision-making processes.
- Convey spatial information in graphical, textual, and verbal forms as an individual or as a collaborating member of a professional team.
- Prepare to take and pass the fundamentals of land surveying examination developed by the National Council of Examiners for Engineering and Surveying (NCEES).
- Satisfy the educational requirements for licensure required by NRS.625.270 as a professional Land Surveyor in Nevada and recognize the benefit of life-long learning by participating in continuing education as students or as instructors.

Entrance to the land surveying/geomatics emphasis requires an earned associate's degree and the completion of a college-level trigonometry course.

Prerequisite Requirements

The following courses or transfer equivalents are prerequisites for completion of the upper-division emphasis requirements:

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CADD 121 CAD for Land Surveyors 3 Credits
The use of computer-aided drafting (CAD) software to create survey plats and topographic maps. The first ten weeks of instruction will focus on learning basic CAD commands. The remaining five weeks will focus on the production of typical survey plats and topographic maps.

GIS 109 Intro Geogrphc Info Syst 3 Credits
An introduction to Geographic Information Systems (GIS) covering the basic concepts. Principles of cartography and spatial analysis are presented. The intent is to prepare the student for advanced training using specific GIS software.

MATH 181 Calculus I 4 Credits
The fundamental concepts of analytic geometry and calculus functions, graphs, limits, derivatives, integrals, and certain applications. It is recommended that students have completed prerequisites within two years of enrolling in this course.

STAT 152 Intro to Statistics 3 Credits
Includes descriptive statistics, probability models, random variables, statistical estimation and hypothesis testing, linear regression analysis, and other topics. Designed to show the dependence of statistics on probability. It is recommended that students have completed prerequisites within two years of enrolling in this course.

SUR 280 Fundamentals Geomatics I 4 Credits
A comprehensive study of angle measurement systems, taping, the traverse, differential leveling, profile leveling, plan and profile sheet, the circular curve, the vertical curve, the USGS 7.5 minute map, and elementary topographic mapping. The application of statistics to surveying, the assumptions underlying surveying on the plane, and reference surfaces are stressed in this course. In the laboratory portion of the course, students will make survey measurements, maintain a field book, and adjust survey data as appropriate. Weekly laboratory reports using the measured data to compute a survey product are required. Lecture+Lab: 3+3. Four semester hours.

SUR 281 Fundamentals Geomatics II 4 Credits
A comprehensive study of the construction and calibration of the modern total station, instrument errors, face positions, survey astronomy, control leveling, calibration of the EDMI, large-scale topographic mapping, and the use of the data collector. In the laboratory portion of this course, students will apply the fundamental principles underlying total station instrument errors, EDMI calibration, astronomic observations for azimuth and large-scale topographic mapping. Weekly laboratory reports using measured data to compute a survey product are required. Lecture+Lab: 3+3. Four semester hours.

SUR 290 Intro Urban Development 4 Credits
An introduction to the process of land development and construction layout. An emphasis is placed on those Nevada State Statutes that define the duties of the Professional Land Surveyor in the subdivision of land. The laboratory portion of the course provides practical exercises involving Topographic Mapping, ALTA/ACSM Title Surveys, Standards of Practice, Elevation Certificates, and Subdivision Design. Lecture+Lab: 3+3. Four semester hours.

One Course Required

PHYS 151 Gen Physics I 4 Credits
Primarily for students in arts and science. Topics include kinematics, energy and momentum conservation, rotational dynamics, thermodynamics, fluids, harmonic motion, and sound. Laboratory experiments illustrate many of these fundamental principles.

PHYS 180 Physics Scientist/Engr I 4 Credits
A comprehensive, calculus-based physics course designed for advanced science and engineering students. Consists of intensive word problem solving covering topics of kinematics, vectors, forces, energy, momentum, rotation, angular momentum, equilibrium, elasticity, gravity, fluids, and oscillations. Lab included.

General Education Requirements

Communications (one course required)

COM 113 Fund Speech Communication **3 Credits**

Principles and theories of speech communication. Participation in public speaking and interpersonal communication activities.

THTR 221 Oral Interpretation **3 Credits**

Introduction to and practice of oral interpretation of literary and dramatic works from Shakespeare to contemporary writers and poets.

Professional Ethics

PHIL 311 Professional Ethics **3 Credits**

A study of the nature of ethical thinking and its application to judgments about actions of people that make up society. Topics to be considered include ethical relativism, moral virtues and vices, foundations of morality, alternative theoretical perspectives on moral judgment, egoism, altruism, and legal and regulatory perspectives related to ethics in business. (Formerly offered as ECON 311)

Professional Communications

ENG 333 Prof Communications **3 Credits**

A course in applied rhetoric for students to develop the writing and communication skills they will need as professionals. The goal is to make strong writers with flexible analysis, writing, and oral communication skills.

Mastery Course Requirements ***(Students admitted to the BAS program with an associates degree other than an Associate of Arts or Associate of Science will be required to take both Humanities and Social Science mastery courses increasing the LSG-BAS degree total credits to 65 for graduation)***

Humanities (one course required)

HUM 301 Studies in Humanities **3 Credits**

An examination of various topics and subjects in the Humanities including art, literature, music, film, theater and others.

INT 339 Integrative Humanities Seminar **3 Credits**

An integrative seminar on topics in the humanities. The topics will vary to address needs and interests of programs. Course fulfills the upper-division integrative humanities general education requirements. May be repeated once for credit if the topics are different.

Mathematics/Science (one course required)

MATH 389 Special Topics in Mathematics **3 Credits**

Covers specialized topics in Mathematics. Course may be repeated up to six credits if topics are different.

INT 359 Integrative Math Seminar **3 Credits**

An integrative seminar on topics in mathematics. The topics will vary to address needs and interests of programs. May be repeated once for credit if the topics are different.

GEOL 335 Earth Resources/Environment **3 Credits**

Geological availability, exploitation, and use of nonrenewable natural resources including metallic minerals, nonmetallic, and energy resources.

INT 369 Integrative Science Seminar **3 Credits**

An integrative seminar on topics in science. The topics will vary to address needs and interests of programs. Course fulfills the upper-division integrative science general education requirements. May be repeated once for credit if the topics are different.

Social Science (one course required)

ANTH 307 Ancient Civilizations **3 Credits**

An exploration of the world's first civilizations and states in Africa, Eurasia and the Americas - the general trends in select regions and coverage of key archaeological sites. A review of theoretical perspectives on the rise and collapse of states along with techniques used in archaeology. This course satisfies the requirements for INT 349.

ANTH 332 (De)Constructing Race **3 Credits**

This course examines the concept of race from an anthropological perspective¿it is an exploration of the biological basis for human variation, the construction of racial categories, the nature of social hierarchy and inequality, and the role of race in systemic inequalities (i.e., education, economics, environment, health security, the legal system, the policing system, food security, housing, political organization, and so on) in the United States and elsewhere. This course satisfies the requirements for INT 349.

HIST 303 Worlds of Islam **3 Credits**

Introduces the theology and culture of early Islam. Examines the history of the 'rightly guided caliphs' era, the Umayyad and Abbasid periods, the Ottoman dynasty and others. Explores recent regional variations in Islam. This course satisfies the requirements for INT 349.

HIST 312 Expansion of the U.S. **3 Credits**

This course will examine the expansion and growth of the United States with emphasis on westward movement and increased international presence over time. Emphasis will be placed on U.S. expansion across North America and beyond. This course satisfies the requirement for INT 349.

HIST 341 Global China **3 Credits**

The outward flow of Chinese culture, cash, power, and people have profoundly influenced world history for thousands of years. This course examines the history of China in a global context from the Qin era to the present with a special focus on modern times and various Chinese migrations. This course satisfies the requirements for INT 349.

INT 349 Integrative Social Science Sem **3 Credits**

An integrative seminar on topics in the social sciences. The topics will vary to address needs and interests of programs. Course fulfills the upper-division integrative social sciences general education requirements. May be repeated once for credit if the topics are different. ANTH 307, ANTH 332, HIST 303, HIST 341, and PSY 313 also fulfill the INT 349 requirement.

PSY 313 Well-Being: East Meets West **3 Credits**

This course will cover topics pertaining to well-being from both a western psychological viewpoint, and an eastern perspective. Topics covered include, but are not limited to: positive psychology, mindfulness, joy, gratitude, cognition, spirituality, health, attachment, and emotions. The focus will be on integrating concepts from both the East and West to arrive at an understanding of what contributes to the well-being of individuals. This course satisfies the requirements for INT 349.

Applied Science Core Requirements

FIN 310 Applied Accounting and Finance **3 Credits**

Course is designed to provide the student with the keys, concepts, and tools used in understanding the financial functions of a business enterprise. For those students with no previous education or experience in accounting, the course will include an introduction to the essential concepts necessary in understanding formal financial statements from the user's perspective.

MGT 310 Found of Mgt Theory/Pract **3 Credits**

Develops the students' theoretical foundation for further study in any field involving management. Explores historical thought and the management functions of planning, organizing, directing, and controlling. Provides a practical analysis of leadership, communications, and motivation techniques. Concludes with an exploration of current management challenges and trends.

One course required

MGT 323 Organiz/Interperson Behav **3 Credits**

A study of the interpersonal relations between individuals and groups in an organizational setting. Topics include leadership styles and techniques, organizational design, communication, decision making, motivation, perception, group behavior, and coping with stress.

MGT 367 Human Resource Management **3 Credits**

Analysis of the personnel policies of business enterprises. Areas of study include recruitment, selection, placement, training, promotion, morale, employee services, compensation, labor relations, and organization and function of human resource departments.

One course required

PHYS 152 Gen Physics II **4 Credits**

A continuation of PHYS 151. Topics include electrostatics, circuits, magnetism, induction, AC circuits, electronics, light optics, special relativity, and an introduction in quantum theory. Lab included.

PHYS 181 Physics Scientist/Engr II **4 Credits**

A calculus-based investigation of thermodynamic laws, kinetic theory, electric charge, field, potential, current, dielectrics, circuit elements, magnetic fields and materials, electromagnetic oscillations. Lab included.

Program Emphasis Requirements

CADD 421 Advanced CAD for Land Surveyor **3 Credits**

The use of computer-aided drafting (CAD) software to create survey plats and topographic maps. Instruction will focus on learning COGO tools, the Command Prompt, traverse with Carlson SurvNet, use deed data to create a deed file, perform deed correlation with field data, create and edit lots and areas and generate lots and setbacks, setup Field to Finish codes and generate 2D and 3D geometry, and utilize various critical coordinate file utilities.

MATH 182 Calculus II **4 Credits**

A continuation of MATH 181. The course covers transcendental functions, methods of integration, conic sections, infinite sequences and series, and first-order differential equations. It is recommended that students have completed prerequisites within two years of enrolling in this course.

SUR 320 GIS for Surveyors **3 Credits**

Reviews the basic concepts in the development and use of Geographic Information Systems (GIS). The course focuses on the application of GIS for land parcel management or the Land Information System (LIS). Applies measurement science to the collection of land information data and the development of the base map. Develops the legal issues associated with the development of land information systems. Introduces the concept of the cadastre and the history associated with land parcel management in the United States.

SUR 330 Intro Least Square Adjust **3 Credits**

This course provides an introductory study of the concepts and mathematics involved in performing least squares adjustment of survey data. The student is introduced to the use of matrices to handle data, systems of linear equations, the use of the Taylor series to linearize equations, the principles of error propagation, and several methods used to fit survey data to mathematical and survey models.

SUR 340 Photogrammetry/Remote Sensing **3 Credits**

Principals of photogrammetry and remote sensing as applied to surveying and mapping. Includes the mapping camera, the photograph, the stereo model, the strip and the block, and flight planning principles. The impact of the digital revolution on photogrammetry, image processing, and remote sensing principles are important topics covered in this course.

SUR 360 Public Land Survey System **3 Credits**

The U.S. Public Land Survey System (PLSS) as described in Official Government Survey Manuals (1851-1973) with emphasis on evidence, both federal and state rules, resurveys, and subdivision of sections. A field project to recover original evidence of the GLO Surveys is required.

SUR 365 Land Descriptions **3 Credits**

Analysis, interpretation, and writing of land descriptions, proper form, controlling elements, metes-and-bounds, sectionalized land descriptions, easements, and right-of-way. Considerations of the parent title, interpretation of expressions, bounds calls, different types of descriptions, junior-senior rights in descriptions, title considerations, and research of public and private records.

SUR 440 Geodetic/Gps Surveying **3 Credits**

Introduces geometric reference to ellipsoids, ellipsoidal and local coordinate systems, coordinate transformation in 2D and 3D, datums and datum transformations, orthometric heights, the reduction of field observations, effects of the earth's gravitational field, state plane coordinate systems, and GPS network design. The student is expected to design a GPS network, collect the data, and process the data to extend control to unknown project control stations.

SUR 450 Construction Surveying **3 Credits**
Prepares students for organizing, planning, and cost estimating for construction and civil engineering projects. Topics include intersections, horizontal curve, spiral curves, vertical curve fitting, route design elements, cross sections, volumes, and other pertinent topics.

SUR 460 Adv Boundary Analysis **3 Credits**
Study of boundary resolution where occupation and possession are not consistent with the record location. Study of unwritten property rights and the presentation of defensible evidence. Review of principles of land tenure and the cadastre, the Statute of Frauds, constructive notice, recording laws, and water boundaries.

SUR 495 Survey/Geomatics Capstone **3 Credits**
Final student project requiring the application of knowledge and skills acquired in previous field experience and coursework. Project may include field/office evidence research, urban subdivision layout, descriptions, map/plat construction, and/or a directed undergraduate research project. Includes the creation of a student portfolio or project report.

Suggested Course Sequence

1st Semester - Fall

Course	Credits
PSC 101	3
ENG 100 or 101	3-5
Fine Arts*	3
Scientific Reasoning*	3
STAT 152	3
TOTAL	15-17

*Choose with advisor

2nd Semester - Spring

Course	Credits
ENG 102	3
Humanities*	3
GIS 109	3
COM 113	3
Scientific Requirement*	3
TOTAL	15

*Choose with advisor

3rd Semester - Fall

Course	Credits
CADD 121	3
MATH 181	4
PHYS 151 or 180	4
SUR 280	4
TOAL	15

4th Semester - Spring

Course	Credits
Structure of Societies*	3
Foundations: Science*	4
SUR 281	4
SUR 290	4
TOTAL	15

*Choose with advisor

5th Semester - Fall

Course	Credits
ENG 333	3
Mastery Course: Humanities or Social Science	3
SUR 320	3
SUR 340	3
SUR 360	3
TOTAL	15

*Choose with advisor

6th Semester - Spring

Course	Credits
Mastery Course: Math/Science	3
PHYS 152 or 181	4
SUR 330	3
SUR 365	3
TOTAL	13

7th Semester - Fall

Course	Credits
MATH 182	4
MGT 310	3
PHIL 311	3
SUR 440	3
SUR 460	3
TOTAL	16

8th Semester - Spring

Course	Credits
CADD 421	3
FIN 310	3
MGT 323 or 367	3
SUR 450	3
SUR 495	3
TOTAL	15