

2003-2004

**Course Descriptions  
Surveying Engineering**

- SUR 221. General Surveying** **1-6 Cr.**
- Use of surveying equipment and procedures in land mapping and general surveying. For nonengineering majors. May be repeated for a maximum of 6 credits.
- SUR 222. Plane Surveying** **3 Cr. (2+3P)**
- Surveying theory and practice as applied to plane surveying, in these areas: error propagation, linear measurements, angle measurements, area determination, differential and trigonometric leveling, and topographic mapping. Prerequisite: Eligible for MATH 191 or MATH 235.
- SUR 231. CADD for Civil Engineering Technology and Surveying** **2 Cr. (6P)**
- Same as ET 231.
- SUR 261. GPS for Nontechnical Students** **3 Cr.**
- Introduction to navigation and positioning using observations collected from the NAVSTAR Global Positioning System (GPS). Emphasis placed on code-phase techniques with hand-held receivers. Prerequisites: consent of instructor.
- SUR 264. Introduction to LIS** **3 Cr. (2+3P)**
- Introduction to Land Information Systems. Land tenure systems, coordinate systems, computer methods. Prerequisites: SUR 222 and CAD course or consent.
- SUR 285. Introductory Photogrammetry** **3 Cr. (2+3P)**
- Introduction to the techniques and uses of photogrammetry in surveying and mapping. The geometry of stereo models. Flight planning. Prerequisite: SUR 222 or consent.
- SUR 292. U. S. Public Land Survey System Boundaries** **3 Cr. (2+3P)**
- Detailed study of the U.S. Public Land Survey System Instructions with special emphasis on New Mexico. Sectionalized land subdivision, corner restoration, and field surveys. Field trips required. Prerequisite: SUR 222.
- SUR 302. History of Surveying** **3 Cr.**
- Explores the definition of surveying through writings by both surveyors and historians. Lectures describe how the craft is, and has been, performed throughout the ages.

- SUR 312. Legal Principles of Boundary Surveying** **3 Cr.**
- Legal principles of property boundary retracement, land descriptions, and rights-of-way. Systems of law and legal research. Requires a legal research paper. Prerequisite: SUR 292, ENGL 318 or consent.
- SUR 328. Principles and Practices of Construction Surveying** **3 Cr. (2+3P)**
- Surveying principles and practice as they are applied to construction surveys. Horizontal, vertical and spiral curves, slope staking, area and volume computations. Prerequisite: SUR 222, MATH 191 or MATH 235.
- SUR 330. Computer Applications of Surveying** **3 Cr. (2+3P)**
- Overview of concepts and tools used in computer applications and manipulation of spatial data. Includes incidental programming in one or more languages, spreadsheet operations, and utilization of commercial software packages. Prerequisites: SUR 222, MATH 191 or MATH 235, CAD course, and formal introduction to programming course (such as CS 167) or consent.
- SUR 351. Introductory Survey Measurements, Analysis, and Adjustments** **3 Cr.**
- Applications of mathematics in surveying. Conventional topics of error ellipses and theory of observations. Emphasis on computer applications for adjustments and analysis. Prerequisites: SUR 222 and MATH 192, or consent of instructor.
- SUR 354. Advanced Surveying** **3 Cr. (2+3P)**
- Control surveys and networks; GPS surveying; state plane coordinates; solar and Polaris observation; horizontal, vertical and spiral curves; photogrammetry; earthwork and volumes; U. S. Public Land Survey System; municipal surveying and land information systems. Prerequisite: SUR 222. **For nonsurveying majors.**
- SUR 361. Introduction to Geodesy** **3 Cr. (2+3P)**
- A study of the ellipsoid of revolution, computations on the ellipsoid, coordinate systems, gravity, and leveling. Prerequisite: SUR 222, MATH 191 or MATH 235.
- SUR 370. Advanced Field Operations** **3 Cr. (2+3P)**
- Presentation of advanced field techniques. Labs will be oriented to production-type work with emphasis on field crew management and incorporating advanced topics. Prerequisite: SUR 328, SUR 330.

<b>SUR 384. Surveying Practicum</b>	<b>1-3 Cr.</b>
<p>Surveying practice under the direction of a licensed, professional land surveyor requiring 45 hours per credit as per a plan worked out between the student and the surveyor and approved by the Surveying Engineering faculty. Work must be certified by the licensed, professional land surveyor. Requires a written report by the student. Prerequisites: SUR 222 and junior standing.</p>	
<b>SUR 401. Ethics and Professionalism in Surveying and Mapping</b>	<b>2 Cr.</b>
<p>Ethics as applied to the surveying profession. Case studies and problems. Prerequisite: SUR 312, SUR 328, and senior standing.</p>	
<b>SUR 410. Advanced Topics in Mapping Sciences</b>	<b>3 Cr. (2+3P)</b>
<p>Development of map projections as the basis for state plane coordinates and other coordinate systems. Organization, management, and use of digital spatial data in terms of conventional and evolving 3-dimensional models. Spatial data accuracy. Prerequisites: SUR 264, SUR 330, or consent.</p>	
<b>SUR 412. Advanced Topics in Boundary Surveying</b>	<b>3 Cr. (2+3P)</b>
<p>Advanced land boundary topics including water boundaries, mineral claims, Spanish and Mexican land grants, state and national boundaries. Prerequisite: SUR 312 or consent.</p>	
<b>SUR 450. Senior Project</b>	<b>1 Cr.</b>
<p>Research project or research paper prepared by student. Includes class presentation. Students will learn how to research after the end of their formal education. Class presentations by professional surveyors. Prerequisite: senior standing.</p>	
<b>SUR 451. Advanced Survey Measurements, Analysis and Adjustments</b>	<b>3 Cr. (2+3P)</b>
<p>Rigorous analysis of theory of observations as applied to surveying. Conventional topics of error ellipses, least squares, and survey pre-analysis, etc. to be addressed. Emphasis on computer applications for adjustments and analysis. Prerequisites: SUR 330, SUR 351, MATH 280, and STAT 371.</p>	
<b>SUR 452. Land Development Design</b>	<b>3 Cr. (2+3P)</b>
<p>Covers different phases of land development process. Study of New Mexico subdivision and condominium laws. Site evaluation includes boundary, control topographic surveys, and environmental and cultural considerations. Students design lot and building arrangements and streets,. Emphasis on use of commercially available computer software. Prerequisite: SUR 312, SUR 328 and SUR 330.</p>	

**SUR 461. Introduction to Satellite Geodesy** **3 Cr. (2+3P)**

An introduction to basic astrodynamics, including the launching of satellites, placing a satellite into orbit, and orbit prediction. Data collected from GPS satellites will be used for orbital analysis and for design and analysis of geodetic networks. Prerequisite: SUR 361, MATH 280.

**SUR 462. Advanced Geodesy** **3 Cr.**

Covers gravitational potential, level surfaces and plumb lines, and spherical harmonic expansion of the gravitational potential. Includes gravity measurements and gravimetric methods, i.,e. the boundary-value problem. Prerequisite: SUR 351 and MATH 291.

**SUR 464. Land Information Systems Applications** **3 Cr. (2+3P)**

The concepts of real property, land tenure and ethics, and land registration systems; the function and design of multipurpose cadastre and land information systems. Prerequisite: SUR 264, SUR 312, and SUR 330.

**SUR 470. Industrial Measurements** **3 Cr. (2+3P)**

Survey measurements and analysis as applied to industrial applications. Topics include deformation studies, optical tooling, etc. Prerequisite: MATH 191 and consent.

**SUR 485. Advanced Photogrammetry** **3 Cr. (2+3P)**

Topics include analytical methods, close-range photogrammetry, photo Resection, and softcopy photogrammetry. Prerequisites: SUR 285 and SUR 451 or consent.

**SUR 498. Special Topics** **1-3 Cr.**

May be repeated for a maximum of 6 credits. Prerequisite: consent.