

**INTRODUCTION TO GEOMATICS**, CRN 2451, ENGR 241-101

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Text: ***Elementary Surveying***; Wolf and Ghilani; Prentice Hall, 11<sup>th</sup> edition

Prerequisites: MTH 122 and MTH 130 or MTH 132 or equivalent

Suggested supplement: Trigonometry by I.M. Gelfand, Mark Saul

Paperback: 229 pages Publisher: Birkhäuser Boston; 1 edition (June 8, 2001)

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### Syllabus Policy

During the first two weeks of semester classes (3 days of summer term), instructors must provide each student a copy of the course syllabus, which includes these items:

- A description of the general course content.
- Approximate dates for major projects and exams
- Grading policy
- Attendance policy

Exceptions to this policy might include thesis, seminar, problem report, independent study, field work, internships, and medical clerkships.

*Adopted by University Council, March 12, 1980; amended by Academic Planning and Standards Committee, April 10, 1980; approved by the President, May 5, 1980.*

### **COURSE DESCRIPTION**

Introduction to geomatics introduces the student to the art, science, and technologies used in the determination of positions above, on, or beneath the earth's surface. Students will gain the ability to understand and apply methods and use instruments to make measurements and collect data for determining horizontal distances; differences in elevation and direction; angular differences; determining locations on the earth's surface; and calculating areas and volumes. The student will develop their own and utilize pertinent computer tools in

calculating, analyzing, and correcting data. Students will be introduced to the science of geodesy and the art of cartography; traverse and control surveys; Global Navigation Satellite Systems; surveying technology and methods; land surveys and deed descriptions; and using maps and geographic information systems to turn survey data into useful information. The course will strive to instill an appreciation for the work performed by surveyors, geodesists, and geographers, cartographers and their importance to practice of civil engineering.

### ***COURSE OBJECTIVES***

With the successful completion of the course, the student should have the capability to:

- Describe the function of surveying in civil engineering construction.
- Work with survey observations, and perform calculations in SI, and US customary units of measure. Identify the sources of measurement errors and mistakes; understand the difference between accuracy and precision as it relates to distance, differential leveling, and angular measurements.
- Be familiar with the principals of recording accurate, orderly, complete, and logical field notes from surveying operations, whether recorded manually or with automatic data collection methods.
- Identify and calculate the errors in measurements and to develop corrected values for differential level circuits, horizontal distances and angles for open or closed-loop traverses.
- Operate an automatic level to perform differential and profile leveling; properly record notes; mathematically reduce and check leveling measurements.
- Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments. Be able to identify hazardous environments and take measures to insure one's personal and team safety.

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- Measure horizontal, vertical, and zenith angles with a transit, theodolite, total station or survey grade GNSS instruments.
- Calculate azimuths, latitudes and departures, error of closure; adjust latitudes and departures and determine coordinates for a closed traverse.
- Perform traverse calculations; determine latitudes, departures, and coordinates of control points and balancing errors in a traverse. Use appropriate software for calculations and mapping.
- Operate a total station to measure distance, angles, and to calculate differences in elevation. Reduce data for application in a geographic information system.
- Work as a team member on a surveying party to achieve a common goal of accurate and timely project completion.
- Calculate, design and layout horizontal and vertical curves.
- Understand, interpret, and prepare plan, profile, and cross-section drawings.
- Work with cross-sections and topographic maps to calculate areas, volumes, and earthwork quantities.

### ***COURSE CONDUCT AND EVALUATION***

This course will be taught in a lecture and field laboratory format. Students are expected to complete reading and homework assignments before the assigned class session. Each student should be prepared to ask questions in class regarding the assigned material.

Attendance for lectures is not mandatory, however:

**To be early is to be on time. To be on time is to be late. To be late is unacceptable.** At the discretion of the instructor, late arrivals may not be allowed to enter the classroom to insure student's security and avoid interrupting classroom activities. Surveying is an outdoor, hands-on activity, therefore laboratory attendance is mandatory.

The use of Vista/WebCT for this course is required. Assignments, quizzes,

and supplemental materials are posted on WebCT. It is the student's responsibility to retrieve and post assigned material to WebCT. Students may access their WebCT accounts from home, campus computer labs, or the library. Due to the plethora of computers available to the student on campus, malfunctioning hardware or sluggish Internet connections are not acceptable justification for missed assignments, quizzes, or exams.

Points are awarded for assignments, quizzes, examinations, laboratory evaluations, attendance, and participation. The final grade is determined by dividing the total points earned by the student by the total points available during the semester.

### ***Evaluation Schedule***

<b>Coursework</b>	<b>% of total</b>	<b>Points</b>
Homework and assignments (various)	10.00%	500
Midterm exam	20.00%	1000
Final exam	20.00%	1000
Quizzes – generally weekly (10 x 100)	20.00%	1000
Laboratory exercises, all complete before "Dead Week"	17.00%	850
Laboratory attendance (13 x 50)	13.00%	650
Total	100%	5000

### ***Grading policy***

The following symbols are used.

A, excellent: 100% to 90%; B, good: 89.9% to 80%; C, passing: 79.9% to 70%; D, below average: 69.9% to 60%; F, failing: 59.9% and below.