Understand how to work with map (plan) scale in its different forms and how to use scale in both location and layout surveys.

Understand what is unique about topographic maps and how to interpret them.

Know what contour lines correspond to and how these provide an idea of topography.

Understand how to read contour lines.

Understand how to use trigonometric functions whenever needed.

Define trigonometric leveling and when it is used.

Understand the steps involved in trigonometric leveling.

Understand stadia principles and how to make distance measurements using stadia lines, both with a level and an inclined telescope.

Know the terms hi, HI, RR, and RI (RI=TW-BW) as well as how these are used to determine elevations and distances in stadia measurements.

Know how to solve problems involving stadia measurements and trigonometric leveling.

Define GPS and know what it stands for.

Know the three segments of GPS and how these segments function.

Know how a GPS receiver determines its position.

Know how to measuring distances from satellites using GPS.

Understand how to apply GPS in surveying.

Understand the use of EDM and total stations.

Understand the differences among electronic theodolites and total stations.

Understand the use of EDM instruments with reflectorless technology.

Find horizontal angles when given a list of data from a repeating theodolite.

Know how to work with vertical angles and how they are referenced in transits, theodolites, and total stations (horizontal, zenith, and nadir).

Know how to work with closed and open traverses.

Understand the methods for measuring angles or line directions in traverse surveys.

Know why, when, and how deflection angles are measured.

Know and be able to use formulas for the sum of interior angles [i.e., (n-2)*180°].

Define the difference between true and magnetic north.

Understand magnetic declination and how it changes over time and location.

Establish a direction of a line if given a bearing.

Establish a direction of a line if given an azimuth.

Convert among bearings, reverse bearings, azimuths, and reverse azimuths.

Compute the bearings and/or azimuths for lines in a traverse (open or closed) given pertinent angles and distances of the lines and the direction of one of the lines.

Understand how to adjust interior angles for an open traverse.
AGEN 135
Construction Surveying

Instructor: Dr. Walid Shayya

Third Examination
Equations Sheet

\[ 1 \text{ ch} = 100 \text{ links} = 66 \text{ ft} = 4 \text{ rods} \]
\[ 1^\circ = 60' \quad 1' = 60'' \quad 1^\circ = 3600'' \]
\[ 1 \text{ yd} = 3 \text{ ft} \]
\[ 1 \text{ m} = 3.2808 \text{ ft} \]

\[ 1 \text{ mi} = 5280 \text{ ft} = 1.609 \text{ km} \]
\[ 1 \text{ ac} = 43,560 \text{ ft}^2 \]

\[ 1 \text{ ft} = 12 \text{ in} \]

\[ \sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} \]

\[ \cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} \]

\[ \tan \theta = \frac{\text{opposite}}{\text{adjacent}} \]

\[ \text{hypotenuse}^2 = \text{opposite}^2 + \text{adjacent}^2 \]

\[ \text{Grade} = \tan \theta = \frac{\text{rise}}{\text{run}} = \frac{\text{opposite}}{\text{adjacent}} \]

\[ \Sigma \text{ of angles} = (n - 2) \cdot 180^\circ \]

\[ S = (TW - BW) \cdot 100 \cdot \cos \theta \]

\[ H = S \cdot \cos \theta \]

\[ V = S \cdot \sin \theta \]

\[ \text{Elev}_B = HI \pm V - RR_B \]