



**DEPARTMENT OF GEOMATICS ENGINEERING**  
**UNDERGRADUATE PROGRAM IN GEOMATICS ENGINEERING**  
**COURSE SYLLABUS**

<b>COURSE</b>	Name	Underground Surveying
	Code	RM184931
	Credits	2 (three)
	Semester	8 (eight)

**COURSE DESCRIPTION**

Underground Survey is an application of Terrestrial Mapping which is used to carry out measurements and mapping under the ground in 3 dimensions. This course explains the theory of measurement, mapping and technology in underground surveys.

**EXPECTED LEARNING OUTCOME**

C	Able to identify, formulate, analyze and solve problems in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.
D	Able to perform spatial data acquisition using modern measurement methods, geospatial data processing, using industry standard software, and making standard designs and analyzes in the fields of geodesy, surveying, hydrography, remote sensing, photogrammetry, and cadastral.
G	Able to plan, perform and evaluate the process of surveying and mapping activities using the latest technology in the fields of geodesy, surveying, hydrographic, remote sensing, photogrammetry, and cadastral.

**COURSE LEARNING OUTCOME**

1	Students are able to understand the measurement methods in underground surveys
2	Students are able to find out the equipment that can be used in underground surveys
3	Students are able to know and understand science and technology in underground survey activities

**COURSE MATERIALS**

1	Mapping Theory
2	Direction and Orientation
3	Horizontal Position Determination
4	Leveling
5	Detailed Measurement of Situations
6	Volume calculation
7	Underground Surveying Equipment
8	Terrestrial Laser Scanner
9	Ground Penetrating Radar and Geoelectric
10	Layout for Line and Grade
11	Underground Survey Application

**PREREQUISITE**

Hydrographic survey

**REFERENCES**

A.	Main References
1	Elementary Surveying 10th Edition . Paul R Wolf and Charles Ghilani.
2	Adjustment Computation.Paul R Wolf
3	Element of Photogrammetry. Paul R Wolf and Bon Dewitt
4	Satellite of Geodesy. Gunter Seeber
5	Route Survey. Lien Tumewu
6	Ground Penetrating Radar Theory and Practise. Harry M Jol
7	The Geometry of Terrestrial Laser Scanning. Soudarissanane
B.	Additional References
1	
2	
3	
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