SUBJECT TEACHING GUIDE

G619 - Topography Applied to Engineering

Degree in Mining Resources Engineering
First Degree in Mining Resources Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Mining Resources Engineering First Degree in Mining Resources Engineering			Type and Year	Compulsory. Year 3 Compulsory. Year 3
Faculty	School of Mines and Energy Engineering				
Discipline	Subject Area: Fundamentals of Cartographic Engineering Module: Training in Common with the Mining Branch				
Course unit title and code	G619 - Topography Applied to Engineering				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA GEOGRAFICA Y TECNICAS DE EXPRESION GRAFICA
Name of lecturer	JULIO MANUEL DE LUIS RUIZ
E-mail	julio.luis@unican.es
Office	E.P. de Ingeniería de Minas y Energía. Planta: + 0. SALA - REUNIONES (Dirección Escuela Minas) (057)
Other lecturers	RAUL PEREDA GARCIA FELIPE PIÑA GARCIA

3.1 LEARNING OUTCOMES

- - Capture field observables automatically.
- Dump and process field observables automatically.
- Generate Digital Models of the Land with diverse computer applications.
- Properly exploit Digital Terrain Models.
- Design, project and calculate geometric layouts in the Plant.
- Design, project and calculate geometric paths in Elevation.
- Design, project and calculate topographical restatements.
- Know the topographic context in the scope of the project.

- - Know the elements involved in the auscultations geodésicas-
- To design, plan and calculate planimetric geodesic ausultaciones angular observable.
- To design, plan and calculate planimetric geodesic auscultation with observable distanciométrico.
- To design, plan and calculate geodesic auscultation altimetry.

- - To design, plan and calculate bathymetric surveys by any of the methods used today.
- Write the part of the specifications related to the surveying project.
- Perform Rated Relations, interim and final payments and work certificates.
- Assess the economic cost of surveying activities.

4. OBJECTIVES

The main objective of the course is focused students in all surveying techniques that are usually developed in the context of engineering, especially in the mining, civil and industrial engineering. To achieve this goal is proposed as secondary objectives, but no less important for students to achieve the acquisition of the competencies defined in the previous section.

6. SUBJECT PROGRAM	
	CONTENTS
1	THEMATIC BLOCK I.- Geometric Layouts and their Stakeout. 1.- General Introduction. 2.- Digital Terrain Models. 2.1.- The capture of observables in the field automatically. 2.2.- The dumping and processing of field observations automatically. 2.3.- The generation of Digital Terrain Models with diverse computer applications. 2.4 .- The exploitation of the Digital Models of the Land. 3.- Geometry in the Plant. 3.1.- Straight alignment and circular alignment. 3.2.- The spiral. 4.- Geometry in Alazado. 5.- Staking out a Geometry. 5.1.- Stakeout in plant. 5.2.- Stakeout in elevation. 6.- The Topo-Cartographic context in the reality of Engineering
2	THEMATIC BLOCK II.- GEODETIC AUSCULTATION, Planimetric and altimetric. 1. Introduction. Length 1.1 benchmark. 1.2 Control of movements. 1.3.- Definition of scenarios. 2. Participants Elements. 2.1 Pillars of auscultation. 2.2 Targets aim. 2.3 Points safety. Polar 2.4. 2.5.- surveying instruments. 3. The angular observation. 3.1 Characterization of movements. 3.2.- The angular observable. 3.3 The observation field angles. 4. Resolution auscultation by observing angles. 4.1 Introduction. 4.2 Numerical method. 4.3 Graphical method. 4.4.- Method coordinate variation in direct intersections. 4.5.- Method of variation of coordinates resections. 4.6.- graphic or numerical reverse through the arc able Intersections properties. 4.7.- Design of the networks involved. 5. The distanciométrica observation. 5.1 Introduction. Instrumental topographical 5.2. 5.3 Method of observation. 6. Resolution of auscultation by observing distances. 6.1 Introduction. 6.2 Numerical method. 6.3 Graphical method. 6.4 Application of the method of variation of coordinates direct intersections. 6.5.- Application of the method of variation of coordinates resections.

3	THEMATIC BLOCK III.- TOPOGRAPHY OBRADOR 1. Underwater photography or bathymetry. 1.1 Introduction 1.2 Referencing ground points. 1.3.- Detailed study of the probes. 1.4.- usual methods. 1.5.- integrated positioning systems. 2. Sheets of particular technical requirements. 2.1 Definition of project. 2.2 Project phases. 2.3 Entities involved in the project. 2.4 The drafting. 2.5.- Specification in topographical activities. 3. Topography of work 3.1 Relations valued and work certificates. 3.2 provisional and final settlement. 3.3 Economic valuation of surveying activities.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
periodic evaluations not qualifying	Written exam	No	Yes	40,00
evaluating practices	Laboratory evaluation	No	No	20,00
Regular testing of the subject	Written exam	Yes	Yes	40,00
TOTAL				100,00

Observations

All students who fail the course in ordinary test, may be submitted to the special examination September, respecting the grade obtained in the continuous evaluation.

Observations for part-time students

Students enrolled in Part Time will be proposed the following alternative evaluation:
- The non-eliminatory periodic evaluations will be carried out on a date agreed upon by the professor and the student at the beginning of the semester.
- The evaluation of the practices will be carried out through an equivalent work and the corresponding test of knowledge about the practices, on a fixed date between the teacher and the student at the beginning of the semester.
- The ordinary and extraordinary tests of the subject will be the same.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

1. FERRER TORIO, Rafael y PIÑA PATON, Benjamín: Topografía de proyectos y obras. Servicio de Publicaciones de la E.T.S.I. de Caminos, Canales y Puertos. Santander, 1991.
2. BALAGUER CAMPHIUS, Enrique; KRAEMER HEILPERNO, Carlos; SANCHEZ BLANCO, Víctor: Trazado de carreteras. Servicio de Publicaciones. E.T.S.I. de Caminos, Canales y Puertos. Madrid, 1977.
3. CONESA LUCERGA, Marcelino; GARCIA GARCIA, Alfredo: Diseño geométrico de carreteras. Servicio de Publicaciones de la Escuela Politécnica de Valencia. Valencia, 1987.
4. SANTOS MORA, A.: Topografía y replanteo de obras de Ingeniería. Edición del Colegio de Ingenieros Técnicos en Topografía. Madrid, 1988.
5. AUSTIN BARRY, B.: Topografía aplicada a la construcción. Limusa, S.A. México, 1989.
6. FERRER TORIO, Rafael: Mediciones en torno a pequeños desplazamientos que se producen en estructuras y suelos de marcado interés en la Ingeniería Civil (presas, muros, taludes.). Servicio de Publicaciones de la E.T.S.I. de Caminos, Canales y Puertos. Santander, 1992.
7. SANTOS MORA, A.: Replanteo y control de presas de embalse. Edición del colegio de Ingenieros Técnicos en Topografía. Madrid, 1993.