

SUBJECT TEACHING GUIDE

G636 - Mining Topography

Degree in Mining Resources Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Mining Resources Engineering			Type and Year	Compulsory. Year 4
Faculty					
Discipline	Subject Area: Technology of Mine Exploitation Module: Training in Exploitation of Mines				
Course unit title and code	G636 - Mining Topography				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA GEOGRAFICA Y TECNICAS DE EXPRESION GRAFICA
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Other lecturers	RAUL PEREDA GARCIA

3.1 LEARNING OUTCOMES

-- Knowledge about the calculation and adjustment of polygonal, direct intersections, inverse sections and other methodologies.

-- Knowledge about the location of a star in the celestial sphere. The time, general considerations and measurement.
- Knowledge about astronomical corrections, orientation and determination of geographic coordinates.

-- Knowledge about the actual shape of the earth.
- Management approach as set eliposide, reference systems.
- Treatment of classical geodetic observations.
- Management of thematic cartography and map projections.
- Design, observe and calculate UTM observations.
- Design, observe and calculate elevation geodetic observations.
- Design, observe and calculate geodetic observations using GPS.

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-- Application of conventional surveying in the field of mining.
- General knowledge of Remote Sensing applied to mining and mapping.
- General knowledge of Geographic Information Systems applied to mining and cartography
- General knowledge of the fundamentals and applications of laser scanning.
- General knowledge of the fundamentals and applications of Georadar.

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 mining 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. COURSE ORGANIZATION

CONTENTS

1	<p>THEMATIC BLOCK I: ADVANCED TOPOGRAPHIC METHODOLOGIES.</p> <p>1.- Calculation and adjustment of polygonal. 2.- The direct intersections. 3.- The reverse intersections. 4.- Other methodologies.</p>
2	<p>THEMATIC BLOCK II: FOUNDATIONS OF GEODETIC ASTONOMY.</p> <p>1.- The location of a star in the celestial sphere. 2.- The time, general considerations and measurement. 3.- Astronomical corrections. 4.- Guidance and determination of geographic coordinates</p>
3	<p>THEMATIC BLOCK III.- THEMATIC BASIS GEODESY AND CARTOGRAPHY</p> <p>1. APPROACH TO THE THEORY OF REAL FIGURE OF THE EARTH. 1.1 The geoid, physical figure of the earth. 1.2 Calculation procedures and key relationships.</p> <p>Ellipsoid of revolution 2. THE FIGURE OF THE EARTH APPROACH. 2.1 Analytical Expression of a surface. 2.2 Tangent plane and normal line to a surface. 2.3 intrinsic geometry of a surface. 2.4 Curvature of surfaces. 2.5.- The normal gravity field.</p> <p>3. TREATMENT OF CLASSIC geodetic observations, reduction. Supporting 3.1 Introduction. 3.2 Corrections weather the current electro instrumentation. Reduction 3.3 points and distances. 3.4.- Reduction of observed angles.</p> <p>4. GENERAL INTRODUCTION TO mapping systems. 4.1 Elements of the flat representation of the ellipsoid. 4.2 map projection systems. 4.3 Introduction to the cartographic developments. 4.4.- Characterization of Lambert coordinates.</p> <p>5. PROJECTION Universal Transverse Mercator (UTM). 5.1 Framework. 5.2 Characteristic features of application of the UTM projection. 5.3 Applications keen interest in the aggregate of engineering.</p> <p>6. Geodetic Aspects elevation. 6.1 particularized aspects of the trigonometric leveling. 6.2 Geometric leveling accuracy.</p> <p>7. GLOBAL POSITIONING SYSTEMS GPS). 7.1 Introduction to GPS. 7.2 Description of the system. 7.3 How GPS works. 7.4.- Geodetic Aspects. 7.5.- methods of observation and calculation with GPS.</p>

4	<p>THEMATIC BLOCK IV.- APPLICATIONS IN THE FIELD OF MINING SURVEYING</p> <p>1. Mine Surveying.</p> <p>1.1 Introduction.</p> <p>1.2 The Optional principal.</p> <p>1.3.- The topography in mining.</p> <p>1.4.- surveying instruments.</p> <p>1.5.- The topographical methodologies.</p> <p>1.6.- Special performances.</p> <p>1.7.- underground topography.</p> <p>2. BASIC PRINCIPLES OF REMOTE SENSING.</p> <p>2.1 Introduction.</p> <p>2.2 Basis of observation.</p> <p>2.3 sensors and satellites.</p> <p>2.4 Remote sensing platforms.</p> <p>2.5.- Digital image analysis.</p> <p>2.6.- Extracting information.</p> <p>2.7.- Verification of results.</p> <p>2.8.- Remote Sensing and GIS.</p> <p>3. basics of GIS.</p> <p>3.1 Basics.</p> <p>Databases 3.2.</p> <p>3.3 GIS models.</p> <p>3.4.- capabilities and sources of error in GIS.</p> <p>4. BASICS OF LASER LIDAR scanner.</p> <p>4.1 Basics.</p> <p>4.2 The sensor.</p> <p>4.3 Practical application.</p> <p>5. GEORADAR.</p> <p>5.1 Basics.</p> <p>5.2 Fundamentals of instrumental and observation method.</p> <p>5.3 Practical application</p>
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7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Regular Test Subject	Written exam	Yes	Yes	60,00
periodic evaluations not qualifying	Written exam	No	No	20,00
evaluating practices	Work	No	No	20,00
TOTAL				100,00
Observations				
All those students who do not pass the subject in the June exam will be able to present themselves to the September session, respecting the grade obtained during the semester in the practices and periodic non-qualifying tests				
Observations for part-time students				
Students enrolled in Part Time will be offered the following alternative evaluation :				
- Periodic non-eliminatoriy assessments will be made on a date agreed by the teacher and the student at the beginning of the quarter.				
- The evaluation of the practices will be carried out through 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. MARTIN ASIN, Fernando: Geodesia y cartografía matemática. Paraninfo. Madrid, 1983.
2. WOLFGANG, Jorge: Geodesia. Editorial Diana. México, 1983
3. SEVILLA, M.J.; NUÑEZ, A.; VALBUENA, J.L.: VII Curso de Geodesia Superior. Instituto de Astronomía y Geodesia. Madrid, 1991.
4. HEISKANEN, Weikko A.; MORITZ, Helmut: Geodesia física. I.G.N.. Madrid, 1985.
5. EXTRUCH SERRA, M.: Topografía aplicada a la Minería. Manresa, 1983.
6. FERNANDEZ FERNANDEZ, Luis: Topografía minera. Universidad de León. León, 1990.
7. CHUVIECO, Emilio: Fundamentos de la teledetección espacial. Rialp, S.A. Madrid, 1990.
8. BOSQUE SENDRA, J.: Sistemas de Información Geográfica. Rialp, S.A. España. 1992.