

Course guide

310620 - 310620 - Physical Geodesy

Last modified: 19/01/2024

Unit in charge: Barcelona School of Building Construction
Teaching unit: 748 - FIS - Department of Physics.
751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN GEOINFORMATION AND GEOMATICS ENGINEERING (Syllabus 2016).
(Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Nuñez Andres, Maria Amparo

Others: Nuñez Andres, Maria Amparo
Tauste Campo, Adrián Francisco

PRIOR SKILLS

Knowledge of Geometric Geodesy, Spatial Geodesy and Geophysics

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Knowledge and application of the methods and techniques of the physics and spatial geodesy; geomagnetism; seismology and seismic engineering; gravimetry.
2. (ENG) Planificació, projecte, direcció, execució i gestió de processos de mesura, sistemes d'informació, explotació d'imatges, posicionament i navegació; modelització, representació i visualització de la informació territorial en, sota i sobre la superfície terrestre.
3. (ENG) Reunir i interpretar informació del terreny i tota aquella relacionada geogràficament i econòmicament amb ell.

TEACHING METHODOLOGY

1. Attendance activity
 - Theoretical classes: masterclass (big group) and participative (medium group)
 - Seminars
 - Resolution of problems
 - Evaluation sessions
2. Personal Activity of the student:
 - Study of the theory
 - Resolution of problems
 - Preparation of projects

LEARNING OBJECTIVES OF THE SUBJECT

Introduce the student to the basic concepts of Physical Geodesy. Highlight the advance of the last years related to the methods and techniques of use of the advanced technology in the measurements in-situ, aerotransported and by satellite.

At the end of the study in this subject the student must be capable of know and apply, at least in a basic level, the methods and techniques of the Physical Geodesy that complement and interact with the Geometric Geodesy and the Spatial Geodesy.



STUDY LOAD

Type	Hours	Percentage
Self study	67,5	60.00
Hours large group	18,0	16.00
Hours medium group	27,0	24.00

Total learning time: 112.5 h

CONTENTS

Gravitational Field of the Earth

Description:

Terrestrial gravitational field
Development of gravitational potential in spheric harmonics
Disturbing potential
Reference ellipsoids
Concept of geoid
Ortometrical height
Geopotencial dimension
Normal gravitational field
Gravity anomalies
Ondulation of the geoid
Desviation of the vertical
Bruns formula
Stockes formula
Vening-Meinesz formula

Related activities:

Hand in exercises

Full-or-part-time: 29h 35m

Theory classes: 6h 30m

Practical classes: 4h

Self study : 19h 05m

Applications

Description:

Determination of the sea level
Applications of the Criosphere

Full-or-part-time: 13h 48m

Theory classes: 1h 48m

Practical classes: 2h

Laboratory classes: 2h

Self study : 8h

Determination of the Geoid Models

Description:

Methods of determination of geoid models

- Determination with anomalies at terrestrial level
- Determination by statistitc methods

Full-or-part-time: 15h 25m

Theory classes: 2h

Practical classes: 3h

Laboratory classes: 2h

Self study : 8h 25m

Gravimetry

Description:

Measurement of the absolute gravity

Measurement of the ralative gravity

Types of gravimeters

Aerotransported gravimetry

Full-or-part-time: 11h 15m

Theory classes: 3h 30m

Practical classes: 1h

Self study : 6h 45m

Gravimetric reductions

Description:

Reduction at the fresh air

Bouger anomaly

Isostasy

Full-or-part-time: 18h 45m

Theory classes: 3h 30m

Practical classes: 4h

Self study : 11h 15m

Geoid models

Description:

Global models

Regional models

Local models

Adjustment of models

Applications in geosciences

Full-or-part-time: 23h 28m

Theory classes: 3h

Practical classes: 4h

Laboratory classes: 2h 28m

Self study : 14h

GRADING SYSTEM

Midterm exam: 20%

Resolution of delivery problems 40%

Writting and deffense of a project 20%

Final exam: 20%

The delivery of practices and assignments will be mandatory.

BIBLIOGRAPHY

Basic:

- Torge, Wolfgang. Geodesy. 4th ed. Berlin [etc.]: Walter de Gruyter, 2012. ISBN 9783110207187.

- Hofmann-Wellenhof, Bernhard ; Moritz, Helmut. Physical Geodesy. 2a ed. Wien ; New York: Springer, 2006. ISBN 3211335447.