Course guide
310620 - 310620 - Physical Geodesy

Last modified: 05/03/2025

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: 2024   **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, Spacial Geodesy and Geophysics

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Knowledge and application of the methods and techniques of the physics ans spacial geodesy; geomagnetism; sismology 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 Physic Geodesy. Highlight the advances of recent years related to the methods and techniques of use of the advanced technology in the measurements in-situ, aerotransportated and by satelite.
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 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
Developement 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 exercices

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 statistic methods

Full-or-part-time: 15h 25m
Theory classes: 2h
Practical classes: 3h
Laboratory classes: 2h
Self study : 8h 25m

Gravimetry

Description:
Measurement of absolute gravity
Measurement of 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 in the outdoors
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: 35%
Resolution of delivery problems 25%
Writting and deffense of a project 5%
Final exam: 35%
The delivery of practices and assignments will be mandatory. Works developed with AI tools will have a qualificacition of NP

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.