Course guide
310620 - 310620 - Physical Geodesy

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: 2022  ECTS Credits: 4.5  Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Nuñez Andres, Maria Amparo
Others: Blas Echebarria Domínguez
Nuñez Andres, Maria Amparo

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 advance of the last years related to the methods and techniques of use of the advanced technology in the measurements in-situ, aerotransportated 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 Physic Geodesy that complement and interact with the Geometric Geodesy and the Spacial Geodesy.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>67.5</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>18.0</td>
<td>16.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>27.0</td>
<td>24.00</td>
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</tbody>
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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
- Orhtometrical 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 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 the absolute gravity
Measurement of the relative 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 30%
Writing and defense of a project. 30%
Final exam: 20%

BIBLIOGRAPHY

Basic: