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 Dominguez
Nuñez Andres, Maria Amparo

PRIOR SKILLS
Knowledge of Geometric Geodesy, Spacial Geodesy and Geophysics

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUDES
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>
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<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
- Ortmometrical height
- Geopotencial dimension
- Normal gravitational field
- Gravity anomalies
- Ondulation of the geoid
- Desviacion of the vertical
- Bruns formula
- Stockes formula
- Vening-Meinesz formula

**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%
Writting and defense of a project. 30%
Final exam: 20%

**BIBLIOGRAPHY**

**Basic:**