

## 26906 - Physics Laboratory Work

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	447 - Degree in Physics
ECTS	6.0
Year	1
Semester	Second semester
Subject Type	Basic Education
Module	---

### 1.General information

#### 1.1.Introduction

#### 1.2.Recommendations to take this course

#### 1.3.Context and importance of this course in the degree

#### 1.4.Activities and key dates

### 2.Learning goals

#### 2.1.Learning goals

#### 2.2.Importance of learning goals

### 3.Aims of the course and competences

#### 3.1.Aims of the course

#### 3.2.Competences

### 4.Assessment (1st and 2nd call)

#### 4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

### 5.Methodology, learning tasks, syllabus and resources

#### 5.1.Methodological overview

The learning process that is designed for this subject is based on the following contents:

- Introduction to the treatment of experimental data: systematic and random error, precision, estimators, Gaussian distribution, error propagation, least-squares adjustments.
- Conducting laboratory practices related to the contents of Fundamentals of Physics, such as determining dynamic quantities, properties of mechanical oscillations, mechanical and thermal properties of materials, thermodynamic systems,

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fluid mechanics, measuring electrical quantities, electric and magnetic fields , wave velocity, standing waves, basic properties of light, measurement of fundamental constants.

### 5.2.Learning tasks

**Formative Activity 1:** Acquisition of basic knowledge of data processing: errors, estimators, etc. (1 ECTS)

Methodology :

- Participative Master Class.
- Troubleshooting and small group cases.
- Application to laboratory work.

Program of lectures :

1. Error Handling
2. Site Statistics Distributions
3. Error propagation
4. Adjustments least squares

**Formative Activity 2:** Conducting laboratory experiments in small groups (4.5 ECTS)

Methodology :

- Work in the laboratory.
- Explanation of work to be done in small groups.
- Teamwork for making experimental data
- Preparation of reports.
- Tutorials in reduced to discuss the content of the reports groups.

Program :

- P1. rigid body
- P2. vibratory motion
- P3. Mechanical properties
- P4. thermal properties
- P5. fluids
- P6. electrical quantities
- P7. electric and magnetic fields
- P8. Light and sound
- P9. fundamental constants
- P10. standing waves and diffraction
- P11. basic properties of light

**Formative Activity 3:** Exhibition of work (0.5 ECTS)

Methodology :

- Oral presentation of one of the reports made.

### 5.3.Syllabus

**Program of lectures :**

1. Error Handling
2. Site Statistics Distributions
3. Error propagation
4. Adjustments least squares

**Laboratory Program :**

- P1. rigid body
- P2. vibratory motion
- P3. Mechanical properties
- P4. thermal properties
- P5. fluids
- P6. electrical quantities
- P7. electric and magnetic fields
- P8. Light and sound
- P9. fundamental constants

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P10. standing waves and diffraction

P11. basic properties of light

### 5.4.Course planning and calendar

Schedule sessions and presentation of works

**Training Activity 1:** 5 hours of lectures and 2 problem solving in small groups during the week from 13 to 17 February.

**Training activity 2:** 11 Practical laboratory. 4 hours classroom for practice-week for 11 weeks (weeks of February 20 to June 8). The student has one week time from the completion of the practice to present the written report of it.

**Training activity 3:** Oral presentation corresponding to one of the practices (week of May 28) report.

**Practice exam:** will be held over a week in sessions of 2 hours per student, and following an equivalent to the development of a practical scheme. Week of June 11.

**Final exam** of the subject (for non-contact students) will be held on the date indicated by the Faculty of Sciences.

### 5.5.Bibliography and recommended resources

- BB Barlow, Roger. Statistics : a guide to the use of statistical methods in the physical sciences / Roger Barlow . - 1st ed. repr. Chichester [etc.] : John Wiley, 1999
- BB Kirkup, Les. Data analysis with excel an introduction for physical scientists Cambridge University Press (2002)
- BB Kirkup, Les. Experimental methods : an introduction to the analysis and presentation of data / Les Kirkup . Brisbane [etc.] : John Wiley and Sons, cop. 1994
- BB Sánchez del Río, Carlos. Análisis de errores / Carlos Sánchez del Río Madrid : Eudema, D.L. 1989