COURSE DATA

DATA SUBJECT

Code: 36595
Name: Basic Physics Laboratory
Cycle: Undergraduate Studies
ECTS Credits: 3.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1929 - Double Degree Program in Physics and Chemistry	Facultat de Química	1	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1929 - Double Degree Program in Physics and Chemistry	Primer Curso (Obligatorio)	COMPULSORY

COORDINATION

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SUMMARY

This course is an adjustment of the course "Introduction to Practical Physics", a basic training course in the first year of the Degree in Physics. It is complemented by Physics I (first semester), II and III (second semester).

This is a basic subject in at least two aspects: the first one is the consolidation and experimental realization of the abstract concepts introduced in the lectures; the second one is the achievement of correct practice in laboratory work (taking data and analyzing it), which leads to the statistical treatment and analysis of uncertainties. Another fundamental aim of this course is to familiarize the student with handling measurement devices and managing quantities, units and uncertainties.

Curriculum keywords:

Laboratory work is based on simple experiments in different branches of physics, chosen for their experimental and conceptual relevance. Introduction to data analysis: direct measurements, determination and propagation of uncertainties, statistical analysis, linear fit, data registration, presentation and analysis of data, basic instrumentation, references and scientific communication of results

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1929 - Double Degree Program in Physics and Chemistry

Interpret the variation of the characteristic properties of chemical elements according to the periodic table.

DESCRIPTION OF CONTENTS

1. THEORY

- Direct measurements and uncertainties estimation: Absolute and relative uncertainties.
- Significant digits.
- Statistical analysis of uncertainties. Type A and Type B uncertainties.
- Mean value and variance of a distribution.
- Propagation of uncertainties.
- Linear interpolation.
- Least squares fits.
- Communication of results. Scientific reports.

2. LABORATORY

P1. Measurement of fundamental quantities. Density of solids and mathematical pendulum
P2. Verification of Ohm's Law. Combination of resistances.
P3. Density and viscosity of liquids
P4. Movement analysis using sonar
P5. Specific heat of metals
P6. Geometrical optics. Imaging
P7. Electromagnetic induction. Transformers
P8. Emission spectra of different elements

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	11,00
Laboratory	24,00
Total hours	**35,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	30,00
Independent study and work	10,00
Preparation of lessons	8,00
Preparation for assessment activities	4,50
Resolution of case studies	0,00
Total hours	**52,50**

TEACHING METHODOLOGY

The course has two parts with a distinct methodology:

1) Lectures

2) Laboratory.

Lectures:

The lectures are structured in sessions that take place during the first weeks of the course.

- The teacher explains the different topics on data analysis and scientific communication interacting with students.

- Students will solve a series of exercises and will perform some activities related to scientific communication.

Laboratory work

In each lab session (3 h) students are grouped in pairs and guided by one teacher. Attendance to these sessions is mandatory and a necessary condition for passing the course. The students must attend the lab having previously read the script of each experiment to be performed in each session (previously known). At the beginning of the session the teacher will monitor the understanding of that script and he will guide students on conceptual and technical aspects necessary to record experimental data.

Each pair of students will have a logbook where he must record data, with tables and graphs, and any

relevant comments on the implementation of the experiment. Students will be supervised during the session by the teacher, helping with correcting errors and work habits.

EVALUATION

Attendance to all the lab sessions is mandatory and a necessary condition for passing the course.

The minimum score to average is 4/10 in the activities of each part (lectures and laboratory)

LECTURES: 20%

Some exercises and and activities performed by the students will be considered, related to data analysis and scientific communication.

LABORATORY: 80%

Experimental development will be checked and assessed at the end of each lab session.

Each pair of students must submit a brief report of each experiment with measurement data, the corresponding analysis (uncertainties, graphics, etc.), together with the results and conclusions.

Additionally, each pair of students must submit a complete report following the structure of a scientific paper: abstract, introduction, material and methods, results and discussion, conclusions and references.

If the minimum grade is not achieved in the seminar evaluation, an exam will be held in the second call. The laboratory is a continuous evaluation activity that cannot be recovered.

REFERENCES

Basic:

- John R. Taylor. Introducción al análisis de errores: el estudio de las incertidumbres en las mediciones físicas. Editorial Reverté, Barcelona, 2014.
- G.L. Squires.Practical Physics, Third edition, Cambridge University Press, 1998.
- P.R. Bevington and D. K. Robinson.Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill International Editions Physics Series, Second Edition 1994.

Additional:

- Carlos Sánchez del Río. Análisis de errores, EUDEMA UNIVERSIDAD: Textos de Apoyo, 1989.