

## COURSE DESCRIPTION

### COURSE DETAILS

Title (of the course): **RADIACIONES IONIZANTES**

Code: 100523

Degree/Master: **GRADO DE FÍSICA**

Year: 2

Field: OPTATIVA 2

Character: OPTATIVA

Duration: SECOND TERM

ECTS Credits: 6.0

Classroom hours: 60

Face-to-face classroom percentage: 40.0%

Study hours: 90

Online platform:

### LECTURER INFORMATION

Name: MOLINA CERRATO, DAVID (Coordinator)

Department: FÍSICA

Area: FÍSICA APLICADA

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### PREREQUISITES AND RECOMMENDATIONS

#### Prerequisites established in the study plan

It will be compulsory to have, at least, a B1 Level in English to take this course. A B1 Level certification in English is mandatory to have this course been recognized as part of the English module.

#### Recommendations

None.

### INTENDED LEARNING OUTCOMES

- |     |  |
|-----|--|
| CB1 | Ability for analysis and synthesis.  |
| CB4 | Ability for the information management.  |
| CB6 | Teamwork.  |
| CE2 | Capacity to estimate orders of magnitude to interpret different phenomena              |
| CE7 | Ability to transmit knowledge clearly, in educational and non-educational environment. |

### OBJECTIVES

Achieve a basic knowledge and understanding of:

1. Practical aspects of ionizing radiation sources.
2. Biological effects of radiation in humans.
3. Applications of ionizing radiation and associated risks.
4. Technical and administrative measures to control radiation exposure.
5. Rules and Regulations about activities involving Ionizing Radiation.
6. Fundamentals of Radiation Detectors.
7. Nuclear spectra analysis.



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### CONTENT

#### 1. Theory contents

Physical and biological basis of the use of radiation and its risks. Radiation measurement and dosimetry.

Radioactivity and environment. Biomedical applications. Other applications. Radiation protection of human beings and the environment. Legislation and regulations.

#### 2. Practical contents

Beta spectra analysis. Radiation Measurement with a Geiger-Müller counter. Gamma spectra analysis.

### SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Quality education

Affordable and clean energy

### METHODOLOGY

#### General clarifications on the methodology (optional)

During the development of teaching activities, except for the express permission of the responsible teacher, the recording of videos and/or audio is strictly prohibited, as well as the use of any kind of electronic device (computers, tablets, mobile phones, smartwatch,... ).

#### Methodological adaptations for part-time students and students with disabilities and special educational needs

To be determined according to the particular case of each student, after a personal interview.

#### Face-to-face activities

Activity	Large group	Medium group	Small group	Total
<i>Assessment activities</i>	3	-	-	3
<i>Case study</i>	-	12	-	12
<i>Lab practice</i>	-	-	12	12
<i>Lectures</i>	33	-	-	33
<b>Total hours:</b>	<b>36</b>	<b>12</b>	<b>12</b>	<b>60</b>

#### Off-site activities

Activity	Total
<i>Activities</i>	10
<i>Group work</i>	10
<i>Information search</i>	10

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Activity	Total
Reference search	10
Self-study	50
<b>Total hours</b>	<b>90</b>

## WORK MATERIALS FOR STUDENTS

Exercises and activities  
 Oral presentations  
 Placement booklet  
 References

### Clarifications

The course materials made available to students should be understood as a study guide and may be intentionally incomplete. As part of their training, it will be the student's task to complete them with their own class notes or bibliographic searches, as well as to complete and develop the calculations and deductions not included in them. All materials will be available on the subject page of the Moodle platform of the University of Córdoba. The dissemination, publication or distribution, directly or indirectly, for profit or not, by any means, of the teaching material made available to the students of the subject is strictly prohibited.

## EVALUATION

Intended learning	Exams	Oral Presentation	Placement reports
CB1	X	X	X
CB4	X	X	X
CB6	X		X
CE2		X	X
CE7	X	X	X
<b>Total (100%)</b>	<b>25%</b>	<b>50%</b>	<b>25%</b>
<b>Minimum grade</b>	<b>0</b>	<b>5</b>	<b>5</b>

(\*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

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**Attendance will be assessed?:**

No

**General clarifications on instruments for evaluation:**

If the minimum grade is not reached in any of the assessment instruments, its grade will be considered to be 0 for the purpose of calculating the final grade for the course.

**Exams:** The final exam will consist of theoretical questions and/or problem solving.

**Placement Reports:** The student will be asked to deliver one or more reports of the different practices carried out in the laboratory. Attendance at the laboratory practice sessions, including the first session, will be mandatory, and the unjustified absence of one of these sessions will mean obtaining a grade of 3 in this evaluation instrument. Justification of the absences must be done by providing as soon as possible an official document to the teacher responsible for the subject, allowing resitting only in that case, always following the instructions of the responsible teacher.

**Oral Presentation:** Group or individual exposition in english of 10-15 minutes of a topic related to ionizing radiations and its applications. Questions can be posed to the students in order to determine their degree of comprehension of the topic.

The mark of the first official call (June) will be calculated according to the previous weighting criteria. Those students who do not achieve the minimum score in one or more of the assessment instruments, or whose score is lower than 5.0 as a result of the previous weighting, will be allowed to repeat in the second call (July) only those assessment instruments in which they did not reach the minimum grade. In the case of the Placement Reports and the Oral Presentation, this will only be possible if the student submitted the corresponding report or memory in due time and form in accordance with the provisions of the teaching staff.

The validity of the grades obtained in the different assessment instruments is limited to the ordinary calls (June and July) and the extraordinary calls (September and April) for the academic year 2023-2024.

**Clarifications on the methodology for part-time students and students with disabilities and special educational needs:**

To be determined according to the particular case of each student, after a personal interview.

**Clarifications on the evaluation of the extraordinary call and extra-ordinary call for completion studies:**

For the extraordinary call and the extra-ordinary call for completion of studies, the same criteria will be followed as for the rest of the calls.

For the extraordinary call, the qualifications of the evaluation instruments of Oral Presentation and Placement Reports will be those obtained in the previous year, in case the student was enrolled in the subject. Otherwise, the student will have a grade equal to 0 in those evaluation instruments.

For the extra-ordinary call for completion of studies, the qualifications of the evaluation instruments for Oral Presentation and Placement Reports will be those obtained during the ordinary calls for the 2023-2024 academic year.

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The validity of the qualifications obtained in the different evaluation instruments in the extraordinary calls is limited to the call in question.

### Qualifying criteria for obtaining honors:

*Those provided in the regulations of the University of Córdoba applicable in this regard.*

## BIBLIOGRAPHY

### 1. Basic Bibliography

- X. Ortega y J. Jorba, Radiaciones Ionizantes: Utilización y Riesgos (2ª Edición), Universitat Politècnica de Catalunya (2009).
- H. Cember y T.H. Johnson, Introduction to Health Physics (4th Edition), McGraw-Hill (2009).
- Ferrer Soria, A. [Antonio] (2018). Técnicas experimentales en física nuclear y de las radiaciones. Universitat de València.

### 2. Further reading

- R.L. Murray y K.E. Holbert, Nuclear Energy: an introduction to the concepts, systems, and applications of nuclear processes (7th Edition), Elsevier (2015).
- E.B. Podgorsak, Radiation Physics for Medical Physicists (2nd Edition), Springer (2010).

## COORDINATION CRITERIA

Common evaluation criteria

Tasks deadlines

## SCHEDULE

Period	Assessment activities	Case study	Lab practice	Lectures
1# Week	0,0	0,0	0,0	3,0
2# Week	0,0	1,0	0,0	2,5
3# Week	0,0	1,0	0,0	2,5
4# Week	0,0	1,0	0,0	2,5
5# Week	0,0	1,0	3,0	2,5
6# Week	0,0	1,0	3,0	2,5
7# Week	0,0	1,0	3,0	2,5
8# Week	0,0	1,0	3,0	2,5
9# Week	0,0	1,0	0,0	2,5
10# Week	0,0	1,0	0,0	2,5



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Period	Assessment activities	Case study	Lab practice	Lectures
11# Week	0,0	1,0	0,0	2,5
12# Week	0,0	1,0	0,0	2,5
13# Week	0,0	1,0	0,0	2,5
14# Week	3,0	0,0	0,0	0,0
<b>Total hours:</b>	<b>3,0</b>	<b>12,0</b>	<b>12,0</b>	<b>33,0</b>

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.