

27231 - Nuclear Chemistry. Physicochemical Properties of Drugs and Radiopharmacy

Syllabus Information

Academic year: 2023/24

Subject: 27231 - Nuclear Chemistry. Physicochemical Properties of Drugs and Radiopharmacy

Faculty / School: 100 - Facultad de Ciencias

Degree: 452 - Degree in Chemistry

ECTS: 5.0

Year: 4

Semester: Second semester

Subject type: Optional

Module:

1. General information

The subject belongs to the Advanced Module of the Degree in Chemistry curriculum. Its objective is to provide students with basic knowledge of Nuclear Chemistry and its medical applications, with special emphasis on radiopharmacy.

It is advisable to have knowledge of Reaction Kinetics, as well as the attendance and active and continuous participation in all activities of the subject.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the Agenda 2030 of the United Nations (<https://www.un.org/sustainabledevelopment/es/>):

- 3: Health and wellness.
- 4: Quality Education.
- 5: Gender Equality.
- 9: Industry, Innovation and Infrastructure.

2. Learning results

- To know the properties of radioisotopes according to their composition, as well as the main nuclear models and their characteristics
- To know and describe the different radioactive breakdown processes, their characteristics and kinetic aspects.
- To know the processes that allow to induce radioactive processes in an artificial way.
- To argue the forms of radiation-matter interaction.
- To know and differentiate the biological effects induced by radiation, as well as the main methods of detection and measurement of radiation and the fundamental aspects of radiation protection.
- To explain the physicochemical mechanisms of action of radiopharmaceuticals.
- To know the applications of radioisotopes in medicine, both diagnostically and therapeutically, and in radiopharmacy.

3. Syllabus

Master classes

1. The atomic nucleus.
2. Kinetic aspects of radioactivity.
3. Radioactive breakdowns
4. Natural and artificial radioactivity.
5. Interaction of radiation with matter.
6. Radiation detection.
7. Biological effects of radiation.
8. Radiological protection.
9. Medical applications of radioisotopes.
10. Radiopharmacy.
11. Physicochemical properties and stability of drugs.
12. Classification and management of radioactive waste.

Practical activities

1. Practical activities will be carried out in hospital nuclear medicine and radiopharmacy units.

2. Practical activities will be carried out on the design of radiological protection of facilities.

4. Academic activities

Participative lectures in large groups (4 ECTS, 3 hours per week) supplemented by tutorials (small groups and/or individualized) and resolution of practical exercises.

Practical application of the knowledge acquired through visits to nuclear medicine facilities, radiotherapy and radiodiagnosis facilities under the supervision of personnel from the Area of Physical Chemistry and the Area of Radiology and Physical Medicine (0.75 ECTS, 3 sessions)

Resolution of practical cases through the use of computer software (0.25 ECTS, 1 session in free time).

5. Assessment system

Assessment activities:

- Performance of a theoretical-practical written test on the contents of the program of lectures and problems
- Completion of the practices of the subject and presentation of the corresponding reports.
- Progressive evaluation of active participation in class and resolution of theoretical and practical questions.

The final grade will be the best of one of these two grades:

- $\text{GRADE 1} = 0.7 \cdot \text{written test grade} + 0.1 \cdot \text{progressive evaluation} + 0.2 \cdot \text{practice grade}$
- $\text{GRADE 2} = 0.8 \cdot \text{written test grade} + 0.2 \cdot \text{practical grade}$.

In the global test, the evaluation of all the activities will be guaranteed, including the practices for those who, exceptionally, have not been able to do them.