SYLLABUS

1. Course title:

Radiopharmaceuticals

2. Code:

3. Cycle of study:

1

4. ECTS credits:

2

5. Type of course:

○ Mandatory ◉ Elective

6. Prerequisites:

None

7. Class restrictions:

None

8. Duration / semester:

1 4

9. Weekly contact hours:

9.1. Lectures:	2
9.2. Seminars:	0
9.3. Laboratory/Practice classes:	0

10. Faculty:

Faculty of pharmacy

11. Department/study program:

Pharmacy (Integrated study I and II cycle)

12. Lecturer:

Dr.sc. Amra Džambić, assistant professor

13. Lecturer's e-mail:

amra.dzambic@untz.ba

14. Web site:

www.frmf.untz.ba

15. Course aims:

Introducing students to the necessary knowledge about radionuclides and radiopharmaceuticals. Understanding the basic concepts of radiopharmacy and applying the acquired knowledge in the production, synthesis, and quality control of radiopharmaceuticals. Application of radiopharmaceuticals in therapy.

16. Learning outcomes:

- mastering basic knowledge and skills for the most successful application of radiopharmaceuticals,
- synthesis and quality control of radiopharmaceuticals,
- protection against the effects of radiation.

17. Course content:

Sources and types of ionizing radiation in the biosphere. Types of radioactive decay. Alpha decay. Beta decay. Gamma decay and internal conversion. Physical quantities in radiopharmacy. Law of radioactive decay, Half-life, Effective half-life. Activity of a radioactive source. Absorbed dose. Kerma. Stopping power. Relative biological effectiveness (RBE). Equivalent dose. Effective dose. Biologically significant fission and activation radionuclides.Methods of radionuclide application, Radiopharmaceuticals, definitions, basic characteristics, and production. Radiopharmaceuticals for diagnostic purposes. Radiopharmaceuticals for therapeutic purposes. Therapy efficiency dependent on physical, chemical, and biological characteristics of radiopharmaceuticals. Diagnostic efficiency dependent on physical, chemical, and biological characteristics of radiopharmaceuticals. Biological aspects of radiation protection. Radiation effects. Deterministic effects. Stochastic effects. Effects of dose and dose rate.

18. Learning methods:

- The classes will be conducted through oral lectures,
- Attendance is mandatory for all students with active participation in the implementation of the classes.
- Solving concrete tasks and problems, as well as broader discussions, -
- Student seminar papers on an assigned topic

19. Assessment methods:

The knowledge assessment consists of Participation, attendance at lectures, and taking two tests during the semester.
Activity: 6- 10 points;
Seminar paper: 7-10 points
Test I: Sources and types of ionizing radiation in the biosphere. Types of radioactive decay. Alpha decay. Beta decay. Gamma decay and internal conversion. Physical quantities in radiopharmacy. Law of radioactive decay, Half-life, Effective half-life. Activity of a radioactive source. Absorbed dose. Kerma. Stopping power. Relative biological effectiveness (RBE). Equivalent dose. Effective dose. Biologically significant fission and activation radionuclides.
21-40 points
Test II: Methods of radionuclide application, Radiopharmaceuticals, definitions, basic characteristics and production. Radiopharmaceuticals for diagnostic purposes. Radiopharmaceuticals for therapeutic purposes. Therapy efficiency depending on the physical, chemical, and biological characteristics of radiopharmaceuticals. Diagnostic efficiency depending on the physical, chemical, and biological characteristics of radiopharmaceuticals. Efficiency of diagnostics from physical, chemical, and biological characteristics of radiopharmaceuticals. Biological aspects of radiation protection. Effects of radiation. Deterministic effects. Stochastic effects. Effects of dose and dose rate.
21-40 points.

Test I and Test II will be conducted during lectures, and the final exam will be held after the end of the semester.In the final exam, students take the parts of the exam that they did not pass during the semester with a minimum number of points, within the regular exam periods.

20. Assessment components:

The exam grade is based on the total number of points a student has earned by completing pre-exam obligations and taking the exam, according to the quality of the knowledge and skills acquired, and contains a maximum of 100 points.
It is determined according to the following scoring scale: Seminar paper: 7-10, Class participation: 6-10, Test I: 21-40
Test II: 21-40
Total:100
(A) - 95-100 points, 10
(B) - 85-94 points, 9
(C) - 75-84 points, 8
(D) - 65-74 points; 7
(E) - 55-64 points, 6
(F) - less than 55 points 5

21. Required reading list:

N. Vanlić-Razumenić, Radiofarmaceutici sinteze, osobine i primjena,
F. Adrović, Jonizujuće i nejonizujuće zračenje i njihovi biološki efekti
Gopal B. Saha, Fundamentals of Nuclear Pharmacy, fifth edition, Springer 2005,

22. Web sources:

23. Applicable starting from the academic year:

2023/2024.

24. Adopted in the Faculty/Academy session:

17.11.2025.