COURSE	: **RADIOBIOLOGY AND RADIATION PROTECION**
TRANSLATION	: RADIOBIOLOGÍA Y RADIOPROTECCIÓN
NUMBER	: FMD3003
CREDITS	: 15 UC/ 9 SCT
MODULES	: 2 THEORETICAL LECTURES
REQUISITES	: MAT1523, FIZ0221, FIZ0311
CONECTOR	: AND
RESTRICTIONS	: 030501, 030401, 030801, 030802 Y 030803
CHARACTER	: OPTATIVE
FORMAT	: THEORETICAL LECTURES
QUALIFICATION	: STANDARD
KEY WORDS	: MEDICAL PHYSICS, RADIOBIOLOGY, RADIOPROTECTION
FORMATIVE LEVEL	: MAGISTER
DISCIPLINE	: PHYSICS

I. COURSE DESCRIPTION

This course is aimed at introducing the student to the field of radiobiology and notions of concepts and radioprotection standards. The course includes lectures and presentations by invited scholars. Students will be evaluated with written tests and oral presentations.

II. LEARNING OUTCOMES

- Learn to handle quantities and units of the radiobiological field
- To know the basic mechanisms of detection and repair of radiation damage in healthy and tumor tissue.
- Know and understand the physical-mathematical models that describe the response to said damage.
- Know the benefits and risks of exposure to ionizing radiation, as well as the fundamental concepts related to radioprotection, shielding calculation and dose limits
- Effectively communicate research papers published in journals of the discipline.

III. CONTENT

- Basic concepts of radiobiology and carcinogenesis
- DNA: morphology and functions
- DNA damage and repair
- Cell death
- Descriptive models of cell survival to radiation
- Oxygen effect
- Linear energy transfer (LET) and relative biological efficiency (RBE)
- Dose-response relationship models:
  probability of tumor control (TCP)
  probability of damage to healthy tissue (NTCP)
- Quantities and units in radioprotection
- Radiation safety standards
- Potential exposure and emergency plans
- Calculation of shields
- Regulatory framework: dose limits

IV. METHODOLOGICAL STRATEGIES

- Lectures with standard contents of a radiobiology course (included in the bibliography) that are complemented with concepts or paradigm changes from recent published works
- Oral presentations of students

V. EVALUATIVE STRATEGIES

• Two tests (80%)
•Oral presentation (20%)

VI. BIBLIOGRAPHY:

REQUIRED

- Joiner, M. and van der Kogel A. (eds.), Basic clinical Radiobiology 4th edition, Edward Arnold, Great Britain, 2009
- Hall E. J., Giaccia A. J., Radiobiology for the Radiologist, Lippincott Williams & Wilkins, Philadelphia, 2012.
- Weinberg, R.A., The Biology of cancer 2nd edition, Garland Science, Taylor & Francis Group, New York, 2014.
- Tubiana, M, Dutreix, J and Wambersie, A, Introduction to Radiobiology, Taylor & Francis, London-New York-Philadelphia, 1990.
- Chapman, J.D and Nahum, A.E. Radiotherapy Treatment Planning: Linear-Quadratic Radiobiology, CRC Press, 2015.
- Mayles P., Nahum A. E., Rosenwald J. C. (eds.), Handbook of Radiotherapy Physics: Theory and Practice, CRC Press, Boca Raton, 2007.
- Podgorsak E. B., Radiation Physics for Medical Physicists, Springer, Berlin, 2010.
- ICRP Report No. 103. "The 2007 recommendations of the International Commission on Radiological Protection." International Commission on Radiation Units and Measurements, Bethesda, MD, 2000).

OPTIONAL
N/A