

## Medical Physics (E092735)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 6.0**

**Study time 180 h**

### Course offerings and teaching methods in academic year 2023-2024

A (semester 2)

English

Gent

lecture

practical

seminar

### Lecturers in academic year 2023-2024

Bacher, Klaus

GE38

lecturer-in-charge

Joseph, Wout

TW05

co-lecturer

Vandenberghe, Stefaan

TW06

co-lecturer

### Offered in the following programmes in 2023-2024

[Bachelor of Science in Engineering\(main subject Biomedical Engineering\)](#)

**crdts**

6

**offering**

A

[Preparatory Course Master of Science in Biomedical Engineering](#)

6

A

### Teaching languages

English

### Keywords

interaction of radiation, dosimetry, image quality, medical imaging, radionuclide therapy, MRI, lasers

### Position of the course

The student acquires knowledge of and insight into how ionising and non-ionising radiation interacts with the human body. Various physical principles and laws are introduced as the basis for applications in medical diagnostics and therapy. Special attention is paid to radiation dosimetry and radioprotection.

### Contents

- Non-ionising electromagnetic radiation
- Interaction of non-ionising radiation with the human body
- Sources and properties of ionising radiation for use in medical diagnostics and therapy
- Interaction of ionising radiation with matter and tissues
- Detection and measurement of ionising radiation
- Basic concepts of radiation dosimetry
- Physical aspects of X-ray imaging
- Physical aspects of radiotherapy and radionuclide therapy
- Radioprotection
- Nuclear magnetic resonance
- Ultrasound

### Initial competences

Physics I and II

### Final competences

- 1 Understand how ionizing and non-ionizing radiation interacts with matter
- 2 Understand physical concepts used in medicine for imaging and therapy
- 3 To be able to apply the principles of radiation dosimetry

### Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Seminar, Lecture, Practical

**Learning materials and price**

Syllabus, slides

**References**

- Intermediate Physics for Medicine and Biology-R.K.Hobbie (2001)
- Medical Physics and Biomedical Engineering- B.H. Brown, R.H. Smallwood, D. C. Barber, P.V. Lawford and D.R. Hose (1999)
- The essential Physics of Medical Imaging - J.T. Bushberg, J.A. Seibert, E. M. Leidholdt, J.M. Boone (2002)
- PT Callaghan: "Principles of NMR microscopy", Oxford Science Publications, Clarendon Press, Oxford (1991)

**Course content-related study coaching**

appointment with the lecturers

**Assessment moments**

end-of-term and continuous assessment

**Examination methods in case of periodic assessment during the first examination period**

Written assessment with open-ended questions

**Examination methods in case of periodic assessment during the second examination period**

Written assessment with open-ended questions

**Examination methods in case of permanent assessment**

Assignment

**Possibilities of retake in case of permanent assessment**

not applicable

**Extra information on the examination methods**

During examination period: written closed-book exam

**Calculation of the examination mark**

- written closed-book examination with open questions and will account for 70%
- the practical assignments will account for 30% of the final mark