Faculty of Medicine in Rijeka

Curriculum
2024/2025

For course

Physics of Medical Diagnostics

Study program:	**Medical Studies in English (R)** University integrated undergraduate and graduate study
Department:	**Department of Medical Physics and Biophysics**
Course coordinator:	**prof. dr. sc. Jurković Slaven, spec. med. fiz.**
Year of study:	**3**
ECTS:	**1**
Incentive ECTS:	**0 (0.00%)**
Foreign language:	**Possibility of teaching in a foreign language**

Course information:

Physics of Medical Diagnostics is a course which gives students an insight into the physical principles required for the acquisition of acceptable diagnostic information. The main part of the course will be dedicated to application of ionizing radiation for imaging. Also, the introduction into physics principles of use non-ionizing radiation (ultrasound and magnetic resonance imaging) for imaging will be presented. The purpose of this course is to introduce students into physical principles of medical imaging and devices used for this purpose.

List of assigned reading:

1. P. Allisy-Roberts and J. Williams:Farr’s Physics for Medical Imaging 2nd edition, Elsevier, 2008.

List of optional reading:

1. D.R.Dance, S.Cristofides; A.D.A.Maidment, I.D.McLean, K.H.Ng: Diagnostic Radiology Physics-A Handbook for Teachers and Students, http://www.pub.iaea.org/MTCD/Publications/PDF/Pub1564webNew-74666420.pdf
2. D.L. Bailey, J.L. Humm, A. Todd-Pokropek, A. van Aswegen: Nuclear Medicine Physics-A Handbook for Teachers and Students, http://www-pub.iaea.org/MTCD/publications/PDF/Pub1617web-1294055.pdf
3. P. Fish: Physics and Instrumentation of Diagnostic Medical Ultrasound, John Wiley & Sons, 1996.
4. C.R. Hill, J.C. Bamber, G.R. ter Haar: Physical Principles of Medical Ultrasonics, John Wiley & Sons, 2004.

Curriculum:

Lectures list (with titles and explanation):

L1 Physics of ionizing radiation

Physics of ionizing radiation

L2 Interaction of X irradiation with matter

Interaction of X irradiation with matter

L3 Dosimetry, principles of quality assurance and radiation protection

Dosimetry, principles of quality assurance and radiation protection

L4 Basic physics of magnetic resonance imaging

Basic physics of magnetic resonance imaging

L5 Physics of ultrasound

Physics of ultrasound

L6 Bioeffects, dosimetry and safety of ultrasound; New methods in ultrasound imaging

Bioeffects, dosimetry and safety of ultrasound. New methods in ultrasound imaging.

Seminars list (with titles and explanation):

S1. Mammography, digital radiography, fluoroscopy, computed tomography

Mammography
Digital radiography
Fluoroscopy
Computed tomography

S2. Single photon emission tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), devices for radiation oncology treatment planning

Single photon emission tomography (SPECT)
Positron emission tomography (PET)
Magnetic resonance imaging (MRI)
Devices for radiation oncology treatment planning

S3. Physical principles of medical ultrasound imaging, doppler ultrasound methods, bioeffects, dosimetry and safety of ultrasound, application of ultrasound in therapy, quality assurance in ultrasound

Physical principles of medical ultrasound imaging
Doppler ultrasound methods
Bioeffects, dosimetry and safety of ultrasound
Application of ultrasound in therapy
Quality assurance in ultrasound

Student obligations:

The attendance at lectures and seminars is mandatory. If necessary, a student can be absent from 30% of the classes of the overall course workload. Students’ obligations are course attendance, active participation, preparation of the seminar and presentation in front of the group.

Exam (exam taking, description of the written/oral/practical part of the exam, point distribution, grading criteria):

Students who: cannot take the final exam.
• They did not prepare a seminar before presenting it in front of the group and who have 30% or more unexcused absences from classes
Such a student is graded F (fail), cannot earn ECTS credits or take the final exam, that is, must re-enroll in the course the following academic year.

The final exam can be taken by students who:
• have create a seminar that was positively evaluated and successfully presented it front of the group.

For the final exam It is enough to register the final exam through the STUDOMAT and if the previously mentioned conditions are met, in the ISVU system will be entered "passed".

Other notes (related to the course) important for students:

Professors and associates are available every day during working hours through e-mail addresses for all questions regarding classes.
Slaven Jurković, PhD, Associate Professor slaven.jurkovic@uniri.hr
Gordana Žauhar, PhD, Full Professor gordana.zauhar@uniri.hr
Marijana Majetić, senior laboratory technician marijana.majetic@uniri.hr - administrator

COURSE HOURS 2024/2025

Physics of Medical Diagnostics

Lectures (Place and time or group)	**Seminars** (Place and time or group)
07.03.2025	
L1 Physics of ionizing radiation: • P01 (09:00 - 10:00) [252] ○ POMD	
prof. dr. sc. Jurković Slaven, spec. med. fiz. [252]	
14.03.2025	
L2 Interaction of X irradiation with matter: • P01 (09:00 - 10:00) [252] ○ POMD	
prof. dr. sc. Jurković Slaven, spec. med. fiz. [252]	
18.03.2025	
	S1. Mammography, digital radiography, fluoroscopy, computed tomography: • ONLINE (13:00 - 15:30) [252] ○ PMD S A
prof. dr. sc. Jurković Slaven, spec. med. fiz. [252]	
20.03.2025	

L3 Dosimetry, principles of quality assurance and radiation protection:
• P01 (11:00 - 13:00) [252]
  ○ POMD
 	
L4 Basic physics of magnetic resonance imaging:
• P01 (11:00 - 13:00) [252]
  ○ POMD
	S1. Mammography, digital radiography, fluoroscopy, computed tomography:
	• ONLINE (08:30 - 11:00) [252]
	  ○ PMD S B

prof. dr. sc. Jurković Slaven, spec. med. fiz. [252]	
25.03.2025	
	S2. Single photon emission tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), devices for radiation oncology treatment planning: • ONLINE (13:00 - 15:30) [252] ○ PMD S A
prof. dr. sc. Jurković Slaven, spec. med. fiz. [252]	
27.03.2025	

L5 Physics of ultrasound: • P01 (11:00 - 13:00) [149] ◦ POMD L6 Bioeffects, dosimetry and safety of ultrasound; New methods in ultrasound imaging: • P01 (11:00 - 13:00) [149] ◦ POMD	S2. Single photon emission tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), devices for radiation oncology treatment planning: • ONLINE (08:30 - 11:00) [252] ◦ PMD S B
prof. dr. sc. Jurković Slaven, spec. med. fiz. [252] · prof. dr. sc. Žauhar Gordana, prof. fizike i kemije [149]	
01.04.2025	
	S3. Physical principles of medical ultrasound imaging, doppler ultrasound methods, bioeffects, dosimetry and safety of ultrasound, application of ultrasound in therapy, quality assurance in ultrasound: • P09 - TEACHING IN ENGLISH (14:00 - 16:30) [149] ◦ PMD S A
prof. dr. sc. Žauhar Gordana, prof. fizike i kemije [149]	
03.04.2025	
	S3. Physical principles of medical ultrasound imaging, doppler ultrasound methods, bioeffects, dosimetry and safety of ultrasound, application of ultrasound in therapy, quality assurance in ultrasound: • P09 - TEACHING IN ENGLISH (08:30 - 11:00) [149] ◦ PMD S B
prof. dr. sc. Žauhar Gordana, prof. fizike i kemije [149]	

List of lectures, seminars and practicals:

LECTURES (TOPIC)	Number of hours	Location
L1 Physics of ionizing radiation	1	P01
L2 Interaction of X irradiation with matter	1	P01
L3 Dosimetry, principles of quality assurance and radiation protection	1	P01
L4 Basic physics of magnetic resonance imaging	1	P01
L5 Physics of ultrasound	1	P01
L6 Bioeffects, dosimetry and safety of ultrasound; New methods in ultrasound imaging	1	P01

SEMINARS (TOPIC)	Number of hours	Location
S1. Mammography, digital radiography, fluoroscopy, computed tomography	3	ONLINE
S2. Single photon emission tomography (SPECT), positron emission tomography (PET), magnetic resonance imaging (MRI), devices for radiation oncology treatment planning	3	ONLINE
S3. Physical principles of medical ultrasound imaging, doppler ultrasound methods, bioeffects, dosimetry and safety of ultrasound, application of ultrasound in therapy, quality assurance in ultrasound	3	P09 - TEACHING IN ENGLISH

EXAM DATES (final exam):

1.	17.04.2025.
2.	25.06.2025.
3.	08.07.2025.
4.	15.09.2025.