

UNIVERSITY OF ZAGREB SCHOOL OF MEDICINE

Plan of the course

Physics of Medical Diagnostics

Academic year **2016/2017**

doc. dr. sc. Ozren Gamulin

I. COURSE AIMS

The main goals of the course Physics of Medical Diagnostics are to:

- discuss and explain the interactions of tissues with electromagnetic radiation and sound, which are the basis of medical diagnostic methods
- present the properties of tissues, which are taken into account in the processing of image formation by different methods
- show the connection between measured parameters and quality of image: resolution, contrast and signal to noise ratio.

II. COURSE STRUCTURE

Course hours:

Lectures: 16

Seminar: 10

Practicum: 4

Total hours: 30

III. PLAN OF THE COURSE AND COURSE SCHEDULE

BLOCKS OF THE COURSE

Number of blocks: 1

Block number	Start	End
1.	26.9.2016	30.9.2016

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Number of blocks: 1

Block number	Start	End
1.	26.9.2016	30.9.2016

BLOCKS OF THE COURSE SCHEME

Block 1

Date	Time	Group	Course hours type	Theme	Teaching staff
Monday 26.9.2016.	08:15-09:45; MEF (C) - Šercer	All	Lectures	Interaction of radiation with tissues; basis for diagnostics	doc. dr. sc. Sanja Dolanski-Babić
	10:15-11:45; MEF (C) - Šercer	A,B	Seminar	Spectroscopy of biological macromolecules and tissues, connection with molecular structure	doc. dr. sc. Ozren Gamulin
	10:15-11:45; MEF Nova vijećnica	C,D	Seminar	Spectroscopy of biological macromolecules and tissues, connection with molecular structure	doc. dr. sc. Maja Balarin

Date	Time	Group	Course hours type	Theme	Teaching staff
Tuesday 27.9.2016.	08:00-11:00; MEF Fizika Praktikum	A	Practicum	Laboratory exercise	dr. sc. Kristina Serec
	11:00-14:00; MEF (C) - Šerčer	All	Lectures	Magnetic resonance in medicine; basics of NMR spectroscopy	doc. dr. sc. Ozren Gamulin
	14:15-15:45; MEF (C) - Šerčer	A,B	Seminar	Magnetic resonance imaging	doc. dr. sc. Sanja Dolanski-Babić
	14:15-15:45; MEF Nova vijećnica	C,D	Seminar	Magnetic resonance imaging	doc. dr. sc. Maja Balarin
Wednesday 28.9.2016.	08:00-11:00; MEF Fizika Praktikum	B	Practicum	Laboratory exercise	dr. sc. Kristina Serec
	11:00-14:00; MEF (C) - Šerčer	All	Lectures	X-ray tube, generation of X-rays; X-ray spectrum; interaction of X-photon and tissue	doc. dr. sc. Ozren Gamulin
	16:30-18:00; MEF Nova vijećnica	A,B	Seminar	Radiography and computerized tomography, resolution and contrast of the image	doc. dr. sc. Maja Balarin
	16:30-18:00; MEF Čačković	C,D	Seminar	Radiography and computerized tomography, resolution and contrast of the image	doc. dr. sc. Ozren Gamulin
Thursday 29.9.2016.	08:30-10:00; MEF (C) - Šerčer	All	Lectures	Physics of nuclear medicine	doc. dr. sc. Sanja Dolanski-Babić
	10:15-11:45; MEF (C) - Šerčer	All	Lectures	Physics of ultrasound	doc. dr. sc. Maja Balarin
	12:00-13:30; MEF (C) - Šerčer	A,B	Seminar	Dosimetry and radiation protection; Interaction of ultrasound with tissue	doc. dr. sc. Maja Balarin
	12:00-13:30; MEF Nova vijećnica	C,D	Seminar	Dosimetry and radiation protection; Interaction of ultrasound with tissue	doc. dr. sc. Sanja Dolanski-Babić
	13:45-16:45; MEF Fizika Praktikum	C	Practicum	Laboratory exercise	Marko Škrabić, ???
Friday 30.9.2016.	08:30-10:00; MEF (C) - Šerčer	All	Lectures	Physics of laser; interactions of laser light with biological molecules, application of laser in medicine	doc. dr. sc. Ozren Gamulin
	11:00-12:30; MEF (C) - Šerčer	C,D	Seminar	Preferences and shortcomings of different diagnostic methods	doc. dr. sc. Sanja Dolanski-Babić
	11:00-12:30; MEF Kompjutorska učionica	A,B	Seminar	Preferences and shortcomings of different diagnostic methods	doc. dr. sc. Maja Balarin
	12:45-15:45; MEF Fizika Praktikum	D	Practicum	Laboratory exercise	Marko Škrabić, ???
Friday 7.10.2016.	14:45-16:15; MEF Biološka	SVI	Exam	Provjera znanja	Marko Škrabić, ???

Number of turns: 1

Duration of turns: 5 working days

Dates: September, 29st – October, 3th 2014

2 laboratory and seminars groups: A, B

A. PLACE: Department of Physics and Biophysics, School of Medicine, Šalata 3b

Lab. work:

Exercise no	Topics
1	Analysis of optical emission spectra of gasses
2	Measurements of gamma source energies by G-M. counter
3	Model of the device for Doppler shift measurement

The attendance is obligatory to all lectures, seminars and lab exercises.

IV. EXAMINATIONS**B. Types of examination and examination dates**

Exam consists of written test with 15 questions. To pass the test it is necessary to answer correctly on 8 questions or 8 points. Exam terms are determined according to agreement.

During the course student can get additional points by solving on-line test which has 5 questions. Each correctly solved question will bring 0,5 point (min 0 to max 2.5). Those points will be added to points received at final written exam. Final grade will be result of total number of points.

Points	Grade
8	2
9	2
10	3
11	3
12	3
13	4
14	4
15	5

V./I LIST OF LECTURERS AND TEACHING STAFF

1. doc. dr. sc. Sanja Dolanski-Babić
2. dr. sc. Kristina Serec
3. Marko Škrabić, ???
4. doc. dr. sc. Ozren Gamulin
5. doc. dr. sc. Maja Balarin

V./II EXTERNAL ASSOCIATES:

1. dr. sc. Marin Kosović

V./III UNTENURED LECTURERS:

VI. LITERATURE

A. Obligatory

01. C. Guy and Dfytche : An Introduction to The Principles of Medical Imaging, Imperial College Press, London, 2005.

B. Additional

01. J. Brnjas-Kraljević: Struktura materije i medicinska dijagnostika, Medicinska knjiga 2001
02. Handouts from lectures, seminars and lab works placed on LMS