

Level: bachelor			
Course title: The Essential Physics of Medical Imaging			
Status: elective			
ECTS: 6			
Requirements: -			
Learning objectives: This module aims to introduce the the physics, mathematics, instrumentation and clinical applications of all common medical imaging modalities including X-ray radiography, computed tomography (CT), ultrasound imaging, positron emission tomography (PET), and magnetic resonance imaging (MRI).			
Learning outcomes: The overall competence is acquiring knowledge and students' ability for individual and team scientific research work in the field of applying physical concepts to the the commonly used and emerging medical imaging modalities. The specific competences are, for example: <i>Knowledge and Understanding:</i> <ul style="list-style-type: none"> • develop basic knowledge of the medical imaging modalities including X-ray/CT, nuclear medicine, ultrasound and magnetic resonance imaging • develop an understanding of general issues in medical imaging that span the common modalities • develop a competence in the fundamental analytical and computational tools used in medical imaging. <i>Skills:</i> <ul style="list-style-type: none"> • the intellectual skills associated with the assimilation of educational subject matter; preparation of notes, revision material, the ability to access and utilise information from a variety of sources • ability to apply knowledge of math, science, engineering • understanding professional, ethical responsibility • recognition of need for and ability to engage in life-long learning • knowledge of contemporary issues 			
Syllabus: <i>Theoretical instruction</i> <ol style="list-style-type: none"> 1. Introduction to medical imaging 2. Image quality: spatial resolution, convolution 3. Image contrast, noise 4. SNR, CNR, ROC 5. X-ray imaging 6. Computed Tomography 7. Nuclear Medicine: clinical applications, basic principles 8. Nuclear Medicine: SPECT, PET 9. MRI: basic physics, RF excitation, relaxation, pulse sequences, tissue contrast, signal localization 10. Ultrasound I: physical principles 11. Ultrasound II: transducer operation, spatial resolution, Doppler <i>Practical instruction</i> <ol style="list-style-type: none"> 1. Practical classes are held in the adequate clinics of Medical Faculty, University of Novi Sad wherein students may be introduced to the practical application of medical imaging modalities in medicine. 			
Literature: <ol style="list-style-type: none"> 1. Paul Suetens, Fundamentals of Medical Imaging, Cambridge University Press, 2009. 2. Nadine Barrie Smith, Andrew Webb, Introduction to Medical Imaging Physics: Engineering and Clinical Applications Cambridge University Press, 2011 3. Anthony B. Wolbarst, Patrizio Capasso, Andrew R. Wyant: Medical Imaging: Essentials for Physicians, John Wiley & Sons, Inc., Hoboken, New Jersey, 2013. 			
Weekly teaching load			Other:
Lectures: 3	Exercises: 2	Other forms of teaching:	