

Level: master			
Course title: The Essential Physics of Ultrasound Imaging			
Status: elective			
ECTS: 8			
Requirements: -			
Learning objectives: This module aims to introduce the the physics, mathematics, instrumentation and clinical applications of common ultrasound imaging.			
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 ultrasound imaging. The specific competences are, for example: <i>Knowledge and Understanding:</i> <ul style="list-style-type: none"> • develop basic knowledge of the medical ultrasound imaging modalities • develop an understanding of general issues in ultrasound imaging modalities • develop a competence in the fundamental analytical and computational tools used in ultrasound 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 • 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 ultrasound imaging 2. Physical characteristics, preparation, and focusing the ultrasonic beam 3. Ultrasound transducers 4. Ultrasonic field-type characteristics. 5. The interaction of ultrasound with biological materials. 6. Ultrasound diagnosis - Transmission and echo technique 7. A-, B- and M-mode 8. Doppler ultrasound (color Doppler ultrasonography, Power Doppler ultrasonography) 9. Image quality: spatial resolution 10. Image artefacts 11. The use of ultrasound in medical diagnostics: ultrasound in gastroenterology, obstetrics, cardiology, 12. Biological effects of ultrasound <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 (Cardiology, Gynecology, Neurology and Radiology), wherein students may be introduced to the practical application of ultrasound 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. 4. K. Kirk Shung: DIAGNOSTIC ULTRASOUND: Imaging and Blood Flow Measurements, Taylor & Francis Group, LLC, 2006 			
Weekly teaching load			Other:
Lectures: 3	Exercises: 2	Other forms of teaching:	