Module: Elective Advanced Lectures: Applied Physics

Module No.: physics70b

Course: Physics in Medicine II: Fundamentals of Medical Imaging (A)

Course No.: physics773

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+1	6	ST

Requirements for Participation:

Preparation:
Lectures Experimental Physics I-III (physik111-physik311) respectively

Form of Testing and Examination:
Requirements for the examination (written or oral): successful work with the exercises

Length of Course:
1 semester

Aims of the Course:
Understanding of the principles of physics of modern imaging techniques in medicine

Contents of the Course:
Introduction to physical imaging methods and medical imaging; Physical fundamentals of transmission computer tomography (Röntgen-CT), positron emission computer tomography (PET), magnetic resonance imaging (MRI) and functional MRI
detectors, instrumentation, data acquisition, tracer, image reconstruction, BOLD effect; applications: analysis of structure and function.
Neuromagnetic (MEG) and Neuroelectrical (EEG) Imaging; Basics of neuroelectromagnetic activity, source models
instrumentation, detectors, SQUIDs; signal analysis, source imaging, inverse problems, applications

Recommended Literature:
K. Lehnertz: Scriptum zur Vorlesung
S. Webb; The Physics of Medical Imaging (Adam Hilger, Bristol 1988)
O. Dössel; Bildgebende Verfahren in der Medizin (Springer, Heidelberg 2000)
W. Buckel; Supraleitung (Wiley-VCH Weinheim 6. Aufl. 2004)
E. Niedermeyer/F. H. Lopes da Silva; Electroencephalography (Urban & Schwarzenberg, 1982)