

**Modules:**

physics700 **Elective Advanced Lectures**  
 physics720 **Applied Physics**

**Course:**

**Physics in Medicine:  
 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:****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)