

[GBH202] MEDICAL IMAGING SYSTEMS

GENERAL INFORMATION

Studies	DEGREE IN BIOMEDICAL ENGINEERING	Subject	?
Semester	1	Course	3
Character	COMPULSORY	Mention / Field of specialisation	
Plan	2022	Modality	Face-to-face
Credits	6	Language	ENGLISH
		Total hours	82.4 class hours + 67.6 non-class hours = 150 total hours

PROFESSORS

BARRENETXEA CARRASCO, MAITANE

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MATHEMATICS II	(No previous knowledge required)
MATHEMATICS I	
MATHEMATICS III	
PHYSICS II	
PHYSICS III	
COMPUTER FOUNDATIONS	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GBR303 - To analyze the operation of medical imaging equipment and apply image processing techniques to improve and parameterize the images obtained.			x	5,08
G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and /or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy		x		0,44
G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		x		0,48
Total:				6

KC: Knowledge or Content / SK: Skills / AB: Abilities

CONTENTS

- 1.- X-Rays
 - 1.1.-Introduction
 - 1.2.-Principles of radiology
 - 1.3.- X-Ray generation
 - 1.4.-Interaction with matter
 - 1.5.-X-Ray detectors
 - 1.6.-Other medical uses
 - 1.7.-The risk of using X-rays
- 2.- Computed Tomography
 - 2.1.- Introduction
 - 2.2.- X-ray source and collimation
 - 2.3.- CT detectors
 - 2.4.- CT reconstruction methods
- 3.- Ultrasound Imaging

3.1.-Introduction

3.2.-Principles of ultrasound imaging

3.3.-Physics of ultrasound

3.4.-Transducers

3.5.-Imaging modalities

3.6.-Doppler ultrasound

4.- Magnetic Resonance Imaging

4.1.-Introduction

4.2.-Microscopic magnetization

4.3.-Macroscopic magnetization

4.4.-Precession and Larmor frequency

4.5.-Transverse and Longitudinal Magnetization

4.6.-RF excitation

4.7.-Relaxation

4.8.-Spin Echoes

4.9.-Basic Contrast mechanisms

4.10.-Instrumentation

4.11.-MRI data acquisition

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Subject notes
 Class presentations
 Video projections
 Computer practical training

Bibliography

Medical Imaging, Signals and Systems, second edition; J.L. Prince and J.M.Links. Pearson 2015.
 Fundamentals of Medical Imaging, second edition; P. Suetens. Cambridge University Press 2009.
 Introduction to Biomedical Engineering; J. Enderle and J. Bronzino. Elsevier 2011.
 Encyclopedia of Medical Devices and Instrumentation, Vol. 2; J.G. Webster.
 Intermediate Physics for Medicine and Biology; R. Hobbie and B. Roth. Springer 2007