

69325 - Medical imaging capture techniques

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	547 - Master's in Biomedical Engineering
ECTS	3.0
Year	1
Semester	Second semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on the flipped classroom method, which consists on the students previously reading and reviewing the class materials (written documents and multimedia material) and then in the teaching sessions they do class discussion, cases and problem-solving.

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5.2.Learning tasks

The course includes the following learning tasks:

- **A01 Lectures** (10 hours). Class presentation by the instructor of the main contents. After the previous reading and reviewing of the assigned material by the student, the instructor will only explain the topics presenting the highest difficulty.
- **A02 Problems and case solving** (14 hours). Students will work on the quizzes and small exercises available on the virtual platform Moodle. Then, a complete discussion will be carried out in class to solve those cases and problems in a collaborative way.
- **A03 Laboratory practice sessions** (2 hours). One practice session will take place in the laboratory. The learning outcomes seen in this session will also be evaluated in the final exam.
- **A05 Assignments**. The student will work on a specific topic previously agreed with the teacher. This assignment will result in a written document of no more than approximately 15 pages.
- **A06 Tutorials**. Students can ask doubts about unclear contents seen in class or supervision of their assignments.
- **A08 Assessment**. Written theory-practical exams, assignment oral presentation.

5.3.Syllabus

The course will address the following topics:

- **Topic 1. Ultrasound Imaging.**
 - o 1.1. Physics of ultrasound.
 - o 1.2. Image modes.
- **Topic 2. Magnetic Resonance Imaging (MRI).**
 - o 2.1. MRI basics.
 - o 2.2. Measurement of relaxation times.
 - o 2.3. Image formation.
 - o 2.4. Contrast.
 - o 2.5. MRI spectroscopy and contrast agents.
- **Topic 3. X-ray Imaging**
 - o 3.1. Basics of X-rays: Generation, effects on matter, and detection.
 - o 3.2. Projection Radiography.
 - o 3.3. Computed Tomography (CT).
- **Topic 4. Nuclear Medicine Imaging.**
 - o 4.1. Planar Scintigraphy (PS).
 - o 4.2. Emission Computed Tomography (SPECT, PET).

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

5.5.Bibliography and recommended resources

The basic material will consist of lecture notes and videos readily available to the student on Moodle. The following textbooks are considered to be auxiliary and complementary readings:

- Prince, J.L., Links, J.M., *Medical Imaging, Signals and Systems*, ISBN0-13-065353-5, Pearson Prentice Hall, 2006.
- Webb, A., *Introduction to Biomedical Imaging*, ISBN 0-471-23766-3, IEEE Press, 2003.
- McRobbie, D.W., Moore, E.A., Graves, M.J., Prince, M.R., *MRI: From picture to proton*, ISBN 13-978-0-521-86527-2, Cambridge University Press, 2007.
- Bushberg, J.T. et al., *The Essential Physics of Medical Imaging*, ISBN-13: 978-0781780575 ISBN-10: 0781780578, Wolters-Kluwer Health - Lippincott, Williams and Wilkins, 2011