Course guides
205060 - 205060 - Biomedical Instrumentation

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).
Academic year: 2021 ECTS Credits: 3.0 Languages: English

LECTURER
Coordinating lecturer: Lexa Nescolarde Selva
Others:

TEACHING METHODOLOGY
Expository methodology, group work and learning through guided activities

LEARNING OBJECTIVES OF THE SUBJECT

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>36.00</td>
</tr>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
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Total learning time: 75 h

CONTENTS

Module 1: Basic Concepts of Medical Instrumentation

Description:
Basic definitions. Biomedical instrumentation system general structure. Dynamic and static characteristics. Biomedical equipment definitive characteristics. Biomedical equipment classifications.

Related activities:
Classroom activity: Static and dynamic characterization of two measurement systems.

Deliverable 1: Characterization of a measurement systems.

Full-or-part-time: 14h
Theory classes: 5h
Self study : 9h
Module 2: Bioelectric Signals

Description:

Related activities:
Lab 1: ECG measurement, QRS detection and heart rate variability.

Classroom activities: Comparison of characteristics of biopotential amplifiers. Interference analysis in a biopotential measurement system.

Deliverable 2: Biopotential amplifier analysis.

Full-or-part-time: 14h
Theory classes: 5h
Self study: 9h

Module 3: Measurements of the cardiovascular system

Description:

Related activities:
Lab 2: Measurement of the pulse wave and transit time.

Classroom activity: Hydrostatic pressure effect on blood pressure estimation.

Deliverable 3: Fick's method.

Full-or-part-time: 14h
Theory classes: 5h
Self study: 9h


Description:
Respiratory pressure and flow measurement. Lung volume measurement. Respiratory mechanics.

Related activities:
Lab 3: Breathing measurement and respiratory rhythm.

Classroom activity: Comparison of spirometers.

Deliverable 4: Apnea detection.

Full-or-part-time: 11h
Theory classes: 4h
Self study: 7h
Module 5: Medical Imaging System

Description:

Related activities:
Lab 4: MRI and US in muscle assessment.

Classroom activities: X-ray attenuation across tissues, resonant frequency on MRI.

Deliverable 5: Transit time and Doppler shift in tissues.

Full-or-part-time: 11h
Theory classes: 4h
Self study: 7h

Module 6: Therapy equipment

Description:
Surgery, diathermy, cryotherapy and lithotripsy equipment

Related activities:
Classroom activity: electrosurgical units comparison.

Deliverable 6: Cardiac ablation systems.

Full-or-part-time: 11h
Theory classes: 4h
Self study: 7h

GRADING SYSTEM

The course will be graded based on:

* Attendance to lessons: 30%
* Class participation and class exercices: 20%
* Final project: 50%

BIBLIOGRAPHY

Basic:

Complementary: