Last update: 27-05-2019

300269 - BODYSEN - Body Sensor Nodes

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering

Teaching unit: 710 - EEL - Department of Electronic Engineering

Academic year: 2019

Degree: MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional)
MASTER'S DEGREE IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT (MASTEAM) (Syllabus 2015). (Teaching unit Optional)

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: RAMON PALLAS ARENY

Others: Primer quadrimestre:
RAMON PALLAS ARENY - M1A21

Serrano Finetti, Roberto Ernesto

Prior skills

DC and AC circuit analysis, linear system theory, analysis and design of basic analog, digital and mixed-signal electronic circuits, random signal analysis, electric and magnetic fields

Degree competences to which the subject contributes

Basic:

CB7. (ENG) CB7 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.

CB9. (ENG) CB9 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.

CB6. (ENG) CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.

Specific:

08 MTM. (ENG) Diseñar e implementar redes de sensores inalámbricas para cualquier aplicación de cualquier ámbito social.

Generical:

03 DIS. (ENG) Diseñar aplicaciones de alto valor añadido basadas en las Tecnologías de la Información y las Comunicaciones (TIC), aplicadas a cualquier ámbito de la sociedad.

06 RES. (ENG) Resolver problemas y mejorar procesos en cualquier ámbito social a partir de la aplicación de las TIC, integrando conocimientos de diversos ámbitos y aplicando ingeniería de alto nivel tecnológico.

Transversal:

05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.

03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

Last update: 27-05-2019

300269 - BODYSEN - Body Sensor Nodes

Teaching methodology

Lectures in the classroom, project design and implementation work in the laboratory, autonomous work outside the classroom and the laboratory.

Learning objectives of the subject

. At the end of the course the student should be able to:
1) Describe the principles of operation of sensors intended for the non-invasive measurement of physiological parameters
2) Design electronic interfaces for those sensors and evaluate their performance.
3) Understand the origin, description and analysis of interference in systems based on those sensors.
4) Understand and apply common methods to reduce that interference and evaluate the results.
5) Conceive, implement and experimentally verify sensor nodes for common physiological parameters.

Study load

Total learning time: 75h	Hours large group:	27h	36.00%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	48h	64.00%

Last update: 27-05-2019

300269 - BODYSEN - Body Sensor Nodes

Content

1. Physiological sensors.	Learning time: 24h Theory classes: 8h Self study : 16h

Description:
Electrodes for biopotentials (ECG, EEG, EMG). Brain-Computer interfaces. Biopotential amplifiers. Pulse oximetry. Bioimpedance measurement and applications: apnea detection.

2. Interference reduction in electronic systems	Learning time: 24h Theory classes: 8h Self study : 16h

Description:
Interference modelling. Signal and safety ground. Ground loops. Shielding. Guards. Signal and power isolation.

3. Design and implementation of body sensor nodes: ECG/EMG front end	Learning time: 24h Laboratory classes: 8h Self study : 16h

Description:
Design specifications and work plan. Concept design. Physical design, implementation and experimental assessment. Project presentation.

Qualification system

Mid-term written exam test (30 %), project work and results (35 %) and a final written exam (35 %).

Bibliography

Basic:

Webster, John G; Clark, John W. Medical instrumentation : application and design. 2nd. ed. New York [etc.]: John Wiley, cop. 1995. ISBN 0471124931.

Complementary:

Ott, Henry W. Electromagnetic compatibility engineering. Hoboken, N.J.: John Wiley & Sons, cop. 2009. ISBN 9780470189306.

Pallás Areny, Ramón; Webster, John G. Analog signal processing. New York [etc.]: John Wiley & Sons, cop. 1999. ISBN 0471125288.