Course guide
820027 - PSB - Biomedical Signal Processing

Last modified: 04/06/2026

Unit in charge: Barcelona East School of Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: MIGUEL ANGEL MAÑANAS VILLANUEVA

Others: Primer quadrimestre:
JOAN FRANCESC ALONSO LÓPEZ - Grup: M11, Grup: M12
MIGUEL ANGEL MAÑANAS VILLANUEVA - Grup: M11, Grup: M12, Grup: M13, Grup: M14, Grup: M15
ABEL TORRES CEBRIAN - Grup: M13

REQUIREMENTS

CONTROL INDUSTRIAL I AUTOMATITZACIÓ - Prerequisit
SENSORS I CONDICIONADORS DE SENYALS - Irequisit

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Apply the techniques for analysing and interpreting biomedical signals and images.

Transversal:
2. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	45,0	30.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

(ENG) INTRODUCCIÓ

Related competencies :
CEBIO-20. Apply the techniques for analysing and interpreting biomedical signals and images.

Full-or-part-time: 11h 30m
Theory classes: 4h
Laboratory classes: 2h 30m
Self study : 5h

(ENG) SENYALS I SISTEMES DE TEMPS DISCRET

Related competencies :
CEBIO-20. Apply the techniques for analysing and interpreting biomedical signals and images.

Full-or-part-time: 20h 30m
Theory classes: 8h
Laboratory classes: 2h 30m
Self study : 10h

(ENG) LA TRANSFORMADA Z

Related competencies :
CEBIO-20. Apply the techniques for analysing and interpreting biomedical signals and images.

Full-or-part-time: 13h
Theory classes: 5h
Self study : 8h

(ENG) ANÀLISI FREQÜENCIAL DE SENYALS

Related competencies :
CEBIO-20. Apply the techniques for analysing and interpreting biomedical signals and images.

Full-or-part-time: 37h 30m
Theory classes: 15h
Laboratory classes: 2h 30m
Self study : 20h

(ENG) FILTRATGE I INTERPRETACIÓ DE SENYALS BIOMÈDICS

Description:
* Sistemes LTI com filtres selectius en freqüència
* Filtres FIR
* Filtres IIR

Related competencies :
CEBIO-20. Apply the techniques for analysing and interpreting biomedical signals and images.

Full-or-part-time: 25h 30m
Theory classes: 10h
Laboratory classes: 2h 30m
Self study : 13h

(ENG) EXEMPLES DE PROCESSAMENT DE SENYALS BIOMÈDICS

Related competencies :
CEBIO-20. Apply the techniques for analysing and interpreting biomedical signals and images.

Full-or-part-time: 9h 30m
Theory classes: 3h
Laboratory classes: 2h 30m
Self study : 4h

(ENG) SISTEMA DE MESURA DE PRESSIÓ ARTERIAL NO INVASIVA

Related competencies :
05 TEQ N3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

Full-or-part-time: 32h 30m
Laboratory classes: 2h 30m
Self study : 30h

GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

BIBLIOGRAPHY

Basic:
- Proakis, John G.; Manolakis, Dimitris G. Tratamiento digital de señales. 4ª ed. Madrid [etc.]: Prentice-Hall, 2007. ISBN 9788483223475.
- Bruce, Eugene N. Biomedical signal processing and signal modeling. New York: John Wiley & Sons, 2001. ISBN 0471345407.

Complementary:
- Sörnmo, Leif; Laguna, Pablo. Bioelectrical signal processing in cardiac and neurological applications. Burlington [etc.]: Elsevier Academic Press, cop. 2005. ISBN 0124375529.

- Semmlow, John L. Biosignal and biomedical image processing : MATLAB-based applications. New York: Marcel Dekker, 2004. ISBN 0824748034.
- Bronzino, Joseph D. The Biomedical engineering handbook. Boca Raton [Fla.]: CRC Press, cop. 2000.
- Najarian, Kayvan; Splinter, Robert. Biomedical signal and image processing. 2nd ed. Boca Raton: CRC/Taylor & Francis, 2012. ISBN 9781439870334.
- Tompkins, Willis J. Biomedical digital signal processing : C-language examples and laboratory experiments for the IBM PC. Englewood Cliffs [etc.]: Prentice Hall, 1993. ISBN 0130672165.

RESOURCES

Hyperlink:
- http://ieeexplore.ieee.org/. Base de dades d'articles de revistes i congressos científics de la Societat IEEE
- http://www.sciencedirect.com. Base de dades d'articles de revistes i congressos científics de l'editorial Elsevier
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