

# Course guide

## 820027 - PSB - Biomedical Signal Processing

Last modified: 27/10/2022

**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:** 2022    **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

Per G\* ENG BIOMÈDICA  
 CONTROL INDUSTRIAL I AUTOMATITZACIÓ - Prerequisit  
 SENSORS I CONDICIONADORS DE SENYALS - Irequisit  
 Per DG BIO-ELECT IND AUT  
 CONTROL INDUSTRIAL I AUTOMATITZACIÓ - Prerequisit  
 SENSORS I CONDICIONADORS DE SENYALS - Irequisit  
 Per DG ELECT IND AUT-BIO  
 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 small group	15,0	10.00
Hours large group	45,0	30.00



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 FREQUÈNCIAL 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

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## BIBLIOGRAPHY

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**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.
- 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.
- 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.

## RESOURCES

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### 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
- <http://www.pubmed.com>. Base de dades d'articles de revistes i congressos científics en el camp de l'Enginyeria Biomèdica i la Medicina