

# Active medical devices

**Titulaire**

Antoine NONCLERCQ (Coordonnateur)

**Mnémonique du cours**

ELEC-H424

**Crédits ECTS**

5 crédits

**Langue(s) d'enseignement**

Anglais

**Période du cours**

Deuxième quadrimestre

**Campus**

Solbosch

## Contenu du cours

The course includes the following chapters:

- > Introduction
- > From idea to market
- > Electrical safety
- > Biomedical signal acquisition
- > Pattern detection
- > Stimulation of excitable tissues
- > Interacting with the nervous system
- > Computational neuroscience

## Objectifs (et/ou acquis d'apprentissages spécifiques)

At the end of this course, the student will be able to:

- > to know the basics of the field of active medical devices and position it in the medtech market
- > to designing and implement specific biomedical acquisition systems (EEG, EMG, ECG, etc.)
- > to detect acquired pattern of interest
- > to model and simulate interaction with the human body (more specifically with the nervous system)
- > to designing and implement specific biomedical stimulation systems

## Méthodes d'enseignement et activités d'apprentissages

Lectures, exercises and a project

## Contribution au profil d'enseignement

This teaching focuses mainly on the development of the following skills:

- > To abstract, model and simulate complex physical systems encountered in biomedical applications (bioelectricity, biomechanics, flows, etc.)
- > To treat and analyze signals of any kind of signals: 1D, image, video, especially those coming from medical devices
- > To represent the fundamental biological mechanisms from the biochemistry of the cell to the functioning of the main systems of human physiology
- > Communicating in English in the field of engineering

## Références, bibliographie et lectures recommandées

Biomedical signal and image processing, K. Najarian and R. Splinter, Taylor and Francis, 2006

EEG signal processing, S. Sanei and JA. Chambers, Wiley, 2007

Medical Instrumentation Application and Design, John G. Webster, Wiley, 2009

Bioinstrumentation, John G. Webster, Wiley, 2009

## Support(s) de cours

Université virtuelle

## Autres renseignements

### Lieu(x) d'enseignement

Solbosch

### Contact(s)

Antoine NONCLERCQ (Antoine.Nonclercq - at - ulb.be)

## Méthode(s) d'évaluation

Autre

### Méthode(s) d'évaluation (complément)

The evaluation is done through a written exam and an oral project defense. The examination includes theoretical issues (restitution, development of concepts seen through examples and procedures) and practical questions.

### Construction de la note (en ce compris, la pondération des notes partielles)

The mark is composed of 50% of the exam and 50% of the project defense.

## Langue(s) d'évaluation principale(s)

Anglais

## Autre(s) langue(s) d'évaluation éventuelle(s)

Français

## Programmes

Programmes proposant ce cours à l'école polytechnique de Bruxelles

MA-IRCB | **Master : ingénieur civil biomédical** | finalité Spécialisée/bloc 1 et MA-IREM | **Master : ingénieur civil électromécanicien** | finalité Spécialisée/bloc 2

