

Biomedical robotics

Lecturers

Emanuele GARONE (Coordinator) and Bernardo INNOCENTI

Course mnemonic

MATH-H509

ECTS credits

5 credits

Language(s) of instruction

English

Course period

Second term

Campus

Solbosch

Course content

The course is structured in the following parts:

- › Robotic structure
- › Robot Kinematics and Dynamics: Planar and Spatial Kinematics, Differential Kinematics; dynamics;
- › Robot Control: Motion control and Force control
- › Robotics for Biomedical Applications: Examples of robotics in biomedical applications, Teleoperation, Specific control/design aspects for biomedical robotics,
- › Robot for minimally invasive surgery, design of robotic tools, human-machine interface

Objectives (and/or specific learning outcomes)

The goal of this course is to present the most important techniques for the design of robots used in the medical field.

Teaching method and learning activities

Lectures: Ex cathedra lectures

Labs : The students will develop a robot control project in small groups (2-3 people) following realistic robotics scenario

Contribution to the teaching profile

This teaching unit contributes to the following competences:

- › understand the main aspect of kinematics dynamic and control of surgical robot;
- › develop a prototype of a realistic robot that could be used in a surgical theater for a realistic surgical treatment;

- › understand and design a surgical robot, able to deal with all the constraint coming from the patient, the surgeon, the surgical theater and the regulation in the field;

References, bibliography and recommended reading

L. Sciacivco, B. Siciliano, *Modelling and Control of Robot Manipulators, 2nd Edition*, Springer-Verlag Advanced Textbooks in Control and Signal Processing Series [<http://www.springeronline.com/sgw/cda/frontpage/0,10735,5-40109-22-2093898-0,00.html>], London, UK, 2000; 1st Edition, McGraw-Hill, New York, NY, 1996. Also in Italian as *Robotica Industriale – Modellistica e Controllo di Manipolatori* [<http://www.prisma.unina.it/images/cover.pdf>], McGraw-Hill Libri Italia, Milano, I, 2nd Edition, 2000; 1st Edition, 1995.

Other information

Place(s) of teaching

Solbosch

Contact(s)

Prof. Emanuele Garone: egarone@ulb.ac.be

Prof. Bernardo Innocenti: Bernardo.Innocenti@ulb.be

Evaluation method(s)

Other

Evaluation method(s) (additional information)

Project Report, Project Results Presentation, a brief Oral Exam

Determination of the mark (including the weighting of partial marks)

50% Laboratory

50% Theory

Main language(s) of evaluation

English

Programmes

Programmes proposing this course at the Brussels School of Engineering

MA-IRCB | Master of science in Biomedical Engineering | finalité Professional/unit 2

