

4.00 credits

45.0 h + 15.0 h

Q2

Teacher(s)	Bastien Guillaume ;Penta Massimo (coordinator) ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	<i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i>
Main themes	The course is based on an intuitive approach of the operating principles of electronic digital and analog. Collages of circuits will also be made to understand the phenomena studied. An introduction to programming will also be proposed as part of the course. In the field of analog electronics, we consider the main passive components (resistors, capacitors, diodes, etc.), The active components (transistors, operational amplifiers, instrumentation amplifiers, etc. ...), physical sensors ( force, acceleration, pressure, displacement, temperature, etc.).. Digital electronics, we will address Boolean logic and binary calculations, as well as the operation of logic gates and flip-flops, micro-controllers and PCs. The course will also include an introduction to programming.
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p>1 The aim of the course is to give the student a sufficient background in the field of analog and digital electronics and programming so that it can (1) to understand the operating principles of equipment used in physiotherapy (such as biofeedback, the electromyogram, isokinetic devices, etc..) and / or (2) designing simple assistive technology for people with disabilities.</p>
Evaluation methods	<p>Attendance at this course is required. The course holders may, under article 72 of the General Regulations for Studies and Examinations, propose to the jury to oppose the registration of a student who has not attended at least 80 % of courses, during the June or September session.</p> <p>Oral and computer room exam with closed notebooks. The exam takes place on the same half-day during the session. The final grade is the weighted average of the marks for the hardware part (10/20) and software part (10/20).</p>
Teaching methods	Theoretical lecture, practical work on a prototyping circuits, demonstrations of measurement protocols, introduction to programming in the computer room.
Content	<p>This course helps to understand how human movement is measured and interpreted by technological devices used in rehabilitation. Different types of signals are explored: force, angle, position, trigger, square waves and quadrature signals. Analog and digital signals are studied as well as conversions from one type to another. The course focuses on the processing and interpretation of signals in two parts: hardware and software.</p> <p>In the hardware part, the general concepts related to signal processing are explored: operation of essential electronic components, voltage divider, filtering, numeration, counting, digitization, calibration. In the software part, the general concepts related to the acquisition of signals and their interpretation are explored: digitization, storage, introduction to programming (in particular with Labview and/or Excel), structure of a program, loops, conditions, user interface design, elements of digital computing, bio-feedback.</p>
Inline resources	See Moodle.
Bibliography	Voir Moodle.
Other infos	Teaching by the holders and supervision of the practical work by the assistants. This course is strictly reserved for student of the FSM, not accessible for other students of UCLouvain.
Faculty or entity in charge	FSM

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Bachelor in Physiotherapy and Rehabilitation	KINE1BA	4	LKINE1006	