UCLouvain

binge1244

2026

Electronic circuits, system and data processing

5.00 crédits	45.0 h	Q2

Cette unité d'enseignement n'est pas accessible aux étudiants d'échange !

Enseignants	Toussaint Sébastien ;
Langue d'enseignement	Anglais
Lieu du cours	Bruxelles Saint-Louis
Acquis d'apprentissage	**A la fin de cette unité d'enseignement, l'étudiant est capable de :** • Maîtriser les éléments fondamentaux de l'électronique (pile, résistance, condensateur, amplificateur optique). • Concevoir ou analyser des circuits élémentaires (Multivibrateurs). • Discuter de la méthodologie sous-jacente à la construction d'un instrument électronique (mesurande, capteur/transducteur, circuit, signal). • Expliquer les principes de fonctionnement de base des technologies électroniques. • Formuler des concepts et des idées de manière scientifique.
Modes d'évaluation des acquis des étudiants	Written closed-book exam with three categories of questions: • A question evaluating the student's ability to understand the **methodology** underlying the construction of an electronic-based instrument (30%) • A series of multiple-choice conceptual questions. These questions evaluate the student's ability to **identify** the relevant **concepts** required to explain an observation and present a **justification** (35%) • A series of exercises. These questions evaluate the student's ability to **solve** problems with numerical values (35%). The use of a simple (non-graphical and non-programmable) calculator is permitted. No form is allowed.
Méthodes d'enseignement	Four hours a week are dedicated to INGE1244 during the semester: an ex-cathedra lecture (two hours) is followed by a session of two hours of exercise session. One (or two) topic is extensively presented ex-cathedra (e.g. the drag force, work-energy theorem, etc.) and the same topic is exemplified in the following exercise session. The exercises can be separated into three categories: synthesis questions, conceptual questions, and computational questions. During the session, the students are expected to work by themselves (alone or in small groups). Nevertheless, the teacher is fully available for four tasks: (1) answer clarification questions, (2) deliver tips to guide students (requesting them) towards the solution, (3) discuss the way the student justifies the answer and (4), if necessary, solve "tougher" problems on the board.
Contenu	This course is the follow-up of "Conceptual physics with technical applications". It aims at illustrating the impact of the elementary physical laws on the economic development of electronics. It focuses on the **methods** underlying the development and design of electronic-based products. After attending this course, the student will be able to: • Master the fundamental building blocks of electronics. • Design or analyse elementary circuits. • Explain the basic working principles underlying electronics technologies. • Formulate concepts and insights in a scientific manner. The course is divided into **three** parts: • Part 1: an extensive description of the silicon-based technologies industry. In this part, the teaching activities focus on the following concepts: switches-based logic, logic gates, arbitrary basis counting (e.g. binary), the different scales in micro- and nano-technologies, printed board circuits and integrated circuit (focusing on the conceptual supply chain). • Part 2: analysis of elementary electronic compounds and circuits. This part of the course focuses on the connection between elementary physical or mathematical laws underlying the realisation of electronic compounds. Here, the teaching activities focus on the following concepts: electromotive force, the physics of resistors and capacitors, vector fields, Gauss law, the RC-circuit. • Part 3: the physics of sensing and detection

	Starting from the environment (sensing a temperature, humidity, gas concentration, etc.) the course focuses on presenting the appropriate sensor choice, illustrates the elementary circuit used for sensing (i.e. the relaxation oscillator) and analyses the collected signal. Signal processing is addressed thanks to filtering. In this part, the teaching activities focus on the following concepts: black box, feedback, the operational amplifier (used in elementary circuits), circuit design on breadboard, filtering. Eventually, most of the concepts presented in the course are illustrated by the ex-cathedra experimental realisations.
Ressources en ligne	Complementary notes related to each course are communicated online each week.
Faculté ou entité en charge:	ESPB

Programmes / formations proposant cette unité d'enseignement (UE)

Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Bachelor of Science in Business Engineering	BBEB1BA	5		