Connaissances fondamentales et éléments de physique

Lecturers
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Course mnemonic
PHYS-H101

ECTS credits
10 credits

Language(s) of instruction
French

Course period
First and second terms

Course content

Basic knowledge of physics : physical dimensions and units, graphs of functions, exponential and logarithmic functions, derivative and partial derivative, exploitation of experimental measures, systems of coordinates, complex numbers, vectors, scalar product and work of a force, vector product and torque.

Thermodynamics : ideal-gas equation, heat, thermodynamic processes, basic thermodynamic cycles, entropy.

Electrostatics : electric field, Gauss's law, electric potential, capacitors, electric resistance.

Magnetostatics : magnetic field, Ampere's law, law of Biot and Savart, magnetic materials.

Electromagnetism : Faraday's law, self-induction, applications, Ampère-Maxwell's law and Maxwell's equations.

Oscillations and waves : harmonic oscillator, damped linear oscillator, resonances, waves, stationary waves.

Laboratory sessions intend to illustrate theoretical lessons and to initiate students to basic measure techniques.

Objectives (and/or specific learning outcomes)

Acquire basic knowledge of thermodynamics, electricity, magnetism, electromagnetism and waves.

- Solve a contextualised problem.
- Modelling (creative use of mathematical tools).
- Notion of approximation, order of magnitude and analyse of physical dimensions.
- Notion of infinitesimal decomposition (integral calculus).
- Notion of phasors (complex numbers).
- Command of abstract ideas (Maxwelle equations).
- Understanding and exploitation of experimental devices.
- Assessment of measure precision and uncertainty.

Pre-requisits and co-requisits

Courses having this one as pre-requisit

BING-F3004 | Anglais scientifique et épistémologie des sciences | 5 crédits, BING-F406 | Gestion de projet et projet de recherche | 5 crédits, CHIM-H314 | Introduction au génie des procédés | 5 crédits and MECA-H3001 | Fluid mechanics and transfer processes | 5 crédits

Courses having this one as co-requisit

BIOL-F321 | Spécificités du développement végétal | 5 crédits, ELEC-H201 | Electricité et électronique | 5 crédits, MATH-F215 | Mécanique | 5 crédits and MECA-H301 | Systèmes énergétiques : principes de bases et technologies durables | 5 crédits

Teaching method and learning activities

The basic knowledge of physics part is an oral lecture regularily interrupted to present exam questions from previous years, in order to show the most frequent errors and expose the correct answers.

The student is asked to be more self-sufficient to follow the continuation of the course, by the use of and audiovisual presentation of theory available on the Virtual University. The teacher devotes the lessons to summarize theory, illustrate concepts by the use of experimental devices and solve problems. The student is asked to participate to the elaboration of problem solutions.

Contribution to the teaching profile

Comprehension and command of basic physics laws used in engineering.

References, bibliography and recommended reading

Physique, E. Hecht (De Boeck Université)

Physique générale, D. Giancoli (De Boeck Université)

Other information

Contact(s)

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Evaluation method(s)

Other

Evaluation method(s) (additional information)

One written examination about the basic knowledge of physics, essentially focused on exercices, is organised at the end of october (a remedial of this exam is proposed in january). Let CF be the mark given to this exam.

One written examination about the first term's theory and exercices of physics is organised in january (a remedial of this exam is proposed in may-june). Let Q1 be the mark given to this exam.

One written examination about the second term's theory and exercices of physics is organised in may-june. Let Q2 be the mark given to this exam.

One laboratory examination is organised in may which includes one practical exam in the laboratory and one written part. Let LAB be the mark given to this exam.

Laboratory testings are organised at the beginning of every session and consist of basic questions evaluating the student's level of preparation. The average mark of these testings gives a bonus added to the LAB mark. The value of this bonus is between 0 and +1.

Exercices testings are organised at the beginning of every exercices session and consist of basic questions evaluating the student's level of preparation. The average mark of these testings gives a bonus added to the Q1 mark during the first term and added to the Q2 mark during the second term. The value of these bonuses is between 0 and +1.

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

Let's define the two following marks:

NOTE1 = 1/10*LAB + 3/10*CF + 3/10*Q1 + 3/10*Q2

NOTE2 = 1/10*LAB + 9/10*(Q1 + Q2)

If (Q1+Q2)/2 is higher or equal to 8/20, than the student's year mark is the highest of marks NOTE1 and NOTE2.

If (Q1+Q2)/2 is lower to 8/20, than the student's year mark is the lowest of marks NOTE1 and NOTE2.

Students are allowed to present an optional oral exam whose mark will be combined 50%-50% with the year mark to obtain the final mark of this physics course.

In second session (augustus-september), the exam includes all the theory and exercices. The bonuses related to testings are abandonned and the previous LAB mark remains unchanged (representing again 10% of the final mark).

Main language(s) of evaluation

French

Programmes

Programmes proposing this course at the Brussels School of Engineering

BA-IRBI | Bachelor in Bioengineering | unit 1

Programmes proposing this course at the faculty of Sciences

BA-IRBI | Bachelor in Bioengineering | unit 1