

6.0 credits

30.0 h + 30.0 h

2q

Teacher(s) :	Fisette Paul ; Sobieski Piotr (coordinator) ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	<p>The course is divided in two parts. The first one (2ECTS) continues the introduction of the fundamentals of electromagnetism; the second one (4ECTS) deals with the mechanics of rigid bodies. Both parts extend the skills acquired previously by the students during course FSAB1201 Physics 1.</p> <p>The first part introduces basic laws of electromagnetism, and their applications in vacuum and matter as well (Biot-Savart & Ampere laws; magnetic induction, simple magnetic circuits). Induction phenomena due to variable magnetic fields (Lenz-Faraday laws, inductance) are then treated.</p> <p>The second part starts with elements of 3D vector geometry needed to represent the instantaneous configurations of one or several interconnected rigid bodies. Next it derives the equations describing the dynamics of a single rigid body (Newton-Euler equations), and then it deals with the tools necessary to modelize rigid bodies dynamics (by means of generalized coordinates). Finally, it briefly presents some elements of rigid bodies statics (cutting method, iso- and hyper-static configurations.).</p>
Aims :	<p>Introductory course to magnetism and mechanics of rigid bodies.</p> <p>At the end of the course, students are expected to be able:</p> <ol style="list-style-type: none"> 1. to use the basic laws of electromagnetism in order to solve simple electromagnetic or electromechanical problems; 2. to express the movement equations of a rigid body supporting various forces in the vectorial form (Newton-Euler equations); to derive system motion equations in terms of generalized coordinates and their derivatives, for a system of interconnected rigid bodies; 3. to use a cutting method to compute a force (or torque) inside an internal link; <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Content :	<p>Summary: content and methods</p> <p>Part 1. Magnetostatics - induction - electromagnetic field</p> <ul style="list-style-type: none"> - Magnetostatics in vacuum - Magnetostatics in matter - Electromagnetic induction phenomena <p>Part 2. Mechanics of rigid bodies</p> <ul style="list-style-type: none"> - Vectorial geometry and kinematics in 3D - Dynamic characterization of a rigid body (mass center, inertia,) - Dynamics of a system of interconnected rigid bodies - Static of a system of rigid bodies <p>Methods: Problem-based learning, exercises, lectures, practical classes</p>
Other infos :	<p>The evaluation has 2 components: an intermediary evaluation during the quadrimester and a final exam at the end of the quadrimester (written exam). The final mark is a combination of the scores in these two evaluations</p> <ul style="list-style-type: none"> - Workfiles for each of the parts (available on the website and in printed version); Reference book: University Physics (Young and Freedman)
Cycle and year of study :	<p>> Bachelor in Engineering : Architecture</p> <p>> Bachelor in Engineering</p>

Faculty or entity in charge:	BTCI
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