


In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 22.5 h	Q2
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Teacher(s)	Fichet Thierry ; Lemaitre Vincent ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	<p>In continuation of the topics addressed in the LPHYS1111 Mechanics 1 teaching unit, wave phenomena such as mechanical waves (coupled springs and pendulums, vibrating string), sound waves and waves on water are studied. The concepts of normal modes of vibration, dispersion, reflection and transmission relationships, wave packets, phase velocity and group velocity, and two- and three-dimensional waves are discussed. Then we talk about the statics and the dynamics of the fluids by insisting on the concepts of pressure and waves on the water. The concept of viscosity and some simple flow examples are presented for incompressible viscous fluids.</p> <p>The basic notions of thermodynamics are then introduced. The concepts of thermodynamic state, pressure and temperature are defined. Internal energy and the first principle of thermodynamics as well as entropy and the second principle of thermodynamics are then presented. Equilibrium conditions and applications (including cycles and thermal machines) are studied. Finally, we describe the kinetic theory of gases, the macroscopic properties of perfect gases and the phase changes of pure bodies.</p> <p>In addition, during the semester and opening up to modern physics, two conferences</p>
Aims	<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>
Evaluation methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b></p> <p>The exam is written. It includes various problems similar to those solved in the guided exercise sessions and some questions which aim to check that the concepts and developments presented during the theoretical course have well been mastered (comprehension questions, demonstrations, ...).</p> <p>All the subjects addressed during the theoretical lessons and the guided exercise sessions must be known for the exam. However, for part A, the students have access to a form with the main formulas, which is posted on the LPHYS1112 MoodleUCL site.</p> <p>It is essential to bring a simple scientific calculator to the exam.</p> <p>For students enrolled in the whole teaching unit, the exam contributes for 18/20 to the final mark (part A: 9.5/20, part B: 8.5/20) and the evaluation of the practical laboratory work for 2/20.</p> <p>For students enrolled only in part A, the exam contributes for 17.5/20 to the final mark and the evaluation of the laboratory practical work for 2.5/20.</p> <p>For students enrolled only in part B, the exam contributes for 18/20 to the final mark and the evaluation of the laboratory practical work for 2/20.</p> <p>An unjustified absence at conferences will result in a loss of 1 point in the final mark.</p> <p>The modalities mentioned above are valid whatever the exam session.</p>
Teaching methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b></p> <p>The teaching activities include (1) the theoretical course, (2) guided exercise sessions, (3) a practical laboratory work, (4) two conferences on themes related to the teaching unit and (5) the tutorial. It is essential to have a simple scientific calculator for the guided exercise sessions and the practical laboratory work.</p> <p>The different subjects are presented in the theoretical course via slides and blackboard notes. The fundamental concepts are illustrated using applications from modern life, short films or animations, and experiments. The guided exercise sessions play an essential role in the comprehension of the theoretical course and allow the application of the studied theoretical concepts to real problems. Participation in the practical laboratory sessions and conferences is mandatory. A laboratory report must be written and submitted at the end of the session. This report is assessed. A tutorial, during which the students may ask their questions to the teaching team, is held each week. The best approach is to work consistently throughout the semester. In particular, it is essential that students regularly solve the exercises themselves, and do not simply read the solutions.</p>
Content	<p>Part A</p> <ol style="list-style-type: none"> <li>Free oscillations of simple systems</li> <li>Free oscillations of systems with a large number of degrees of freedom</li> </ol>

	<ul style="list-style-type: none"> <li>3. Forced oscillations</li> <li>4. Progressive waves</li> <li>5. Reflection, transmission and interference</li> <li>6. Modulation, pulse and wave packets</li> <li>7. Two- and three-dimensional waves, polarization</li> <li>8. Introduction to statics and dynamics of fluids</li> </ul> <p>Part B</p> <ul style="list-style-type: none"> <li>1. Fundamental notions</li> <li>2. Work and heat</li> <li>3. Internal energy and the first law</li> <li>4. Perfect and real gases: microscopic approach</li> <li>5. Entropy and the second law</li> <li>6. Thermodynamic potentials and functions</li> <li>7. Phase changes of a pure body</li> <li>8. Thermal machines</li> </ul>
<p>Inline resources</p>	<p>The slides and the short films or animations projected during the theoretical course and conferences, the list of exercises to be solved, the supports for practical laboratory work and other useful documents are made available to students on the MoodleUCL website of LPHYS1112.</p>
<p>Faculty or entity in charge</p>	<p>PHYS</p>

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Aims
Minor in Physics	<a href="#">LPHYS100I</a>	5		
Bachelor in Mathematics	<a href="#">MATH1BA</a>	5		