Programme of Studies:  *Physics*
Name of the module:  *Quantum Physics*
Target group:  *1st Cycle Physics students (and potentially engineering students)*
Level of the unit:  *Introductory* (Bachelor level, 3rd year)
Entrance requirements:  *Classical mechanics, Electromagnetism*
Number of ECTS credits:  *8*

Competences to be developed:
- Capacity for analysis and synthesis
- Modelling (subject related competence, see Final Report Pilot Project Phase I, pages 294-297)
- Problem solving (subject related competence, ibidem)
- Theoretical understanding (subject related competence, ibidem)
- Physics culture (subject related competence, ibidem)
- Ability to solve Schrödinger equations
- Composition of angular momenta
- Handling the operators formalism
- Familiarity with the postulates of quantum mechanics

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>Educational activities (at the institution in a class, contact hours)</th>
<th>Estimated student work time in hours</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schroedinger equation</td>
<td>Lectures, Problem Solving (an integrated sequence, 18 L + 14 PS = 32 hrs)</td>
<td>32</td>
<td>written exam</td>
</tr>
<tr>
<td>Operator Formalism</td>
<td>Lectures, Problem Solving (an integrated sequence, 8L + 5 PS = 13 hrs)</td>
<td>13</td>
<td>oral exam</td>
</tr>
<tr>
<td>Angular Momentum</td>
<td>Lectures, Problem Solving (an integrated sequence, 7 L + 7 PS = 14hrs)</td>
<td>14</td>
<td>written exam</td>
</tr>
<tr>
<td>Postulates of Quantum Mechanics</td>
<td>Lectures (synthesis of fundamentals, discussion cases and paradoxes, 5L = 5 hrs, each lecture at the appropriate place in the unit integrated sequence)</td>
<td>5</td>
<td>oral exam</td>
</tr>
</tbody>
</table>

The total workload of the student is:

\[(38+26) \text{ contact hrs} + (65+30+25+20) \text{ private study time hrs} = 204 \text{ hrs}.\]

This example shows that the private study time varies depending on the educational activity within the unit, ranging from less than 2 hrs per contact hour (Angular momenta) to 4 hrs per contact hour (Postulates).

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