1. Module title: | Programming of Portable Graphical Applications
2. Field / responsibility of: | Physics / the department, the Dean of Studies
3. Module contents: | Professional, object-oriented software development, currently using the language C++ and the class library Qt:
   a) Object-oriented programming in C++:
      - Classes
      - Virtual functions
      - Templates
   b) The class library Qt of the KDE project:
      - Signal-slot mechanisms
      - Introduction to GUI techniques
      - From Unix to Windows
      - The Qt designer (GUI programming using drag & drop)
4. Qualification objectives of the module / competencies to be acquired: | Learning of object-oriented programming techniques of C++, practicing these techniques using a complete class library as an example. At the end of the course, the participants fulfill all prerequisites to develop professional, platform-independent software.
5. Prerequisites for participation:
   a) Recommended knowledge: Good knowledge of the programming language C
   b) Prerequisite courses: None
6. Module can be used for: M.Sc.(and B.Sc.) in Physics, Nanoscience, Computational Science
7. Module is offered: On a semiannual basis
8. Module can be completed in: 1 semester
9. Recommended semester of study: 1
10. Overall module workload / number of credit points: Workload:
    Total number of hours: 180
    Allocation:
    1. Attendance: 4 credit hours
    2. Independent study (including exam preparation/ exam): 110 hours
    Credit points: 6

The successful completion of all assignments listed in items 11 and 12 is a prerequisite for receiving the credit points mentioned in item 10.
### 11. Module components:

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Req./req. elective</th>
<th>Form of teaching</th>
<th>Subject area/topic</th>
<th>Credit hours</th>
<th>Coursework</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY-M-VS 09</td>
<td>Compulsory</td>
<td>Lecture Practical course</td>
<td>Programming of portable graphical applications</td>
<td>4</td>
<td>Successful completion of the practical exercises (with the instructor signing off each course session); project work</td>
</tr>
</tbody>
</table>

### 12. Module exam:

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Competence / topic</th>
<th>Type of exam</th>
<th>Duration</th>
<th>Time / notes</th>
<th>Weighting for module grade</th>
</tr>
</thead>
</table>

### 13. Notes:

Successful participation in the practical course is a prerequisite for taking the module exam.