PHY-M-VF 8

Effective WS 2011/12 / Please also read the comments in item 13.

1. Module title:	**Computational Physics**
2. Field / responsibility of:	Physics / the faculty, the Dean of Studies
3. Module contents:	This module covers methods used in particle and condensed matter physics. Potential topics include: • Monte Carlo methods • Numerical solutions to partial differential equations • Cluster algorithms • Lattice field theory: Introduction, numerical methods, implementation on the computer, analysis and interpretation of numerical data • Quantum transport • Electron structure of condensed matter • Molecular dynamics • Complex systems: Random walk, percolation, cellular automata • Numerical methods for phase transitions
4. Qualification objectives of the module / competencies to be	Acquiring knowledge of key concepts and techniques of numerical simulations in physics
5. Prerequisites for participation:	
a) Recommended knowledge:	Quantum mechanics I, basic knowledge of a programming language
b) Prerequisite courses:	None
6. Module can be used for:	MSc. in Physics, MSc. in Nanoscience, M.Sc. in Comp. Science; BSc. in Comp. Science
7. Module is offered:	On a yearly 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: 240** **Allocation:** **1. Attendance: 6 credit hours** **2. Independent study (including exam preparation/ exam): 150 hours** **Credit points: 8**

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:

Nr.	Req./req. elective	Form of teaching	Subject area / topic	Credit hours	Coursework
PHY-M -VF 8 .1	Required elective	Lecture Practical course	Computational physics	6	Programming exercises

PHY-M-VF 8

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12. Module exam:

Nr.	Competence / topic	Type of exam	Duration	Time / notes	Weighting for module grade
PHY-M -VF 8 .1	Computational physics			Type of exam: Oral or exam or programming project; duration: oral 20 min, or written 105 min, 135 min or 210 min (if it consists of two parts); time: Lecture period to end of semester	1

13. Notes:

Modules "NS-M-4: Computational Nanoscience" and "NS-M-5: Molecular Electronics" of the master's degree program in nanoscience as well as module CS-B-P8 ("Numerical Methods") of the bachelor's degree program in computational science also count as module "Computational Physics". It is important to ensure that a module is used only once. Further information will be provided by the instructors at the beginning of the course.

PHY-M-VF 8

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2