12998-214(16) Computational Physics A (3l, 3p)

2014

Course summary:

Computer-based projects in stochastic (non-deterministic) physical systems. Topics change annually. Typical examples include statistical data analysis, stochastic growth and interference effects.

Continuous assessment

PP Physics 114, 144
C Physics 224
C Scientific Computing 272

Outcomes of course:

Insight into the physics of selected simple stochastic physical systems.

- Working knowledge of basic concepts of statistics as used in physics.
- Appreciation of the fundamentally different character of computational physics as compared to analytical physics.
- The ability to write and debug simple computer simulations of stochastic physical systems.
- Appreciation of the importance and role played by numerical error and approximation in simulation.
- Develop skills in compiling and maintaining a record of own work and thoughts.
- Familiarity on beginner's level with the operating system currently used in the module and some of its numerical and graphical applications.

Lecturers:

Prof H. Weigel (first quarter)
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Prof HC Eggers (second quarter)
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Office: Room number 1045, Merensky Physics Building.

Course content:

Formal lectures
Basics on numericals methods (elementary programming skills are prerequisite). Projects on stochastic (non-deterministic) physical systems using computer simulations. Topics change from year to year. Typical topics covered include random walks, wave phenomena, analysis of empirical data.

Laboratory work

Practical (Tutorials):

Students work individually or in groups on their tutorial assignments and/or projects during the tutorial session under supervision of the lecturer or a tutor.

Study material:

Due to the nature of this module there is no single prescribed text book. Study notes and reference material will be handed out by the lecturer.

Learning opportunities:

The individual work on simulation projects constitutes an effective learning opportunity. Every lecture and tutorial is an opportunity to discuss the project work with the lecturer and fellow students.

Assessment:

Methods of Assessments
Assessment is based on "continuous assessment". Assessment of the student's notes and computer programs and questions asked by the lecturer based on the student's notes as well as tutorial tests. Depending on time available, students make oral presentations on own work or sections of the prescribed material.

Venue and time of assessment opportunities
A number of assessment opportunities are spread evenly throughout the semester.

Availability of marks:
Marks will be available within a reasonable time. Feedback is given in terms of written and oral commentary.

Calculation of class mark:

60 per cent of mark: homework (written notes and programs)
20 per cent of mark: classwork
20 per cent of mark: project presentation (oral and/or essay)