

10752-713(8) Solid State Physics (1½l, 1½p)

2016

Course summary:

Diffraction by crystals and the reciprocal lattice. Periodic crystal potentials, the tight-binding model, semi-conductors. Magnetism: para-, dia-, ferro- and antiferromagnetism. Superconductivity.

Outcomes of course:

The course is intended as introduction to various aspects of solid state physics. Students who complete the course will be familiar with the basic physical principles underlying a variety of fundamental phenomena in the solid state.

Lecturer:

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Mentor:

The Department of Physics has appointed a staff member as mentor for each year of its physics programme to be available to students for consultation. Students should feel free to discuss general issues related to the physics programme or specific modules in the programme with the relevant mentor, in addition to usual consultations with their individual lecturers of modules.

The mentor for honours programme and its modules is Prof HC Eggers eggers@physics.sun.ac.za

Course content:

Specific heat problem: Boltzmann, Einstein and Debye model. Electrons in metals: Drude and Sommerfeld theory. Vibration in solids and phonons. Tight binding model: an introduction. Geometry of crystals. Neutron and X-ray diffraction. Electron in solids and bands theory. Application to the bands theory: physics of semiconductors. Magnetism: para-, dia-, ferro- and antiferromagnetism.

Practical (Tutorials):

Weekly tutorials (as per honours course schedule)

Study material:

Prescribed textbook: S.H.Simon "The Oxford Solid State Basic", Oxford University Press (2013).

Assessment:***Methods of Assessments***

Assessment shall occur by means of continuous assessment, comprising the following: One final written exam which includes both theoretical questions and exercises; three homework assignments; one or more oral examinations (theory and/or exercises).

Venue and time of assessment opportunities

See timetable

Availability of marks:

Immediately following assessment or assignment.

Calculation of final mark for the module:

Final examination 40/100, homework assignments 54/100, one in-class oral examination 6/100.