

12998-224(16) Classical Mechanics, Waves and Optics (3ℓ, 3p)

2015

Course summary:

Velocity-dependent non-conservative force, conservative systems in three-dimensional space, central force motion, planetary and satellite motion, scattering of particles, multi-particle systems, dynamics of rigid bodies, geometrical optics, free and forced linear oscillations with damping, one-dimensional wave motion with boundary conditions, Doppler effect, interference and diffraction, physical optics.

Continuous assessment

PP Physics 114

P Mathematics 114, 144

P Physics 144

Outcomes of course:

Students are introduced to more advanced concepts in Newtonian classical mechanics. Students are introduced to concepts regarding wave phenomena in various facets of Physics, with emphasis on applications in Optics. Students will be expected to gain abilities in calculations on these systems as well as in the conceptual understanding of the physics.

Lecturer:

Prof KK Müller-Nedebock: Mechanics

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Course content:

Mechanics

Conservative forces and conservation laws within the Lagrangian formulation of dynamics. Applications to classical systems with gravity. Nonconservative, velocity-dependent forces.

Waves & Optics

Forced and damped oscillations, coupled oscillators. Wave motion, superposition, interference. Elements of Optics.

Practicals & Tutorials:

Experiments and tutorials will expand upon and complement the lectures. Experiments can include: Studies of forced and damped oscillator, elastic and inelastic collisions, determination of the velocity of light, simple spectroscopic investigations as well as investigations of standing waves.

The experimental part of this module is integral to the course. Both the active participation during practicals as well as subsequent reports will be contribute to the practical mark.

Study material:

Prescribed textbook: "Mechanics" (3rd edition) by LD Landau and E.M Lifshitz, Elsevier,

Prescribed textbook: **Vibrations and Waves by George C. King**

Assessment:

Methods of Assessments

Continuous Assessment

The continuous assessment includes multiple **assignments, problem-solving sessions, and practical reports, tutorial test** as well as short examinations taken **orally**

Venue and time of assessment opportunities

See **timetable** on Physics home page as well as official University webpage, tutorials and classroom lectures are also possible assessment times.

Availability of marks:

Papers, assignment and feedback are returned within two weeks of the deadline to hand in.

Calculation of final mark for the module:

The final mark will be calculated as follows:

For all continuous assessment opportunities: oral exams 1/5, practicals 1/5, problem solving 1/5 and assignments/tests 2/5