School of Mathematics

Course 241 — Mechanics 1998-99
(SF Mathematics, SF Theoretical Physics, optional for JS Mathematics, JS & SS Two-subject Moderatorship)

Lecturer: Professor Siddhartha Sen

Requirements/prerequisites: 131, 141

Duration: 24 weeks

Number of lectures per week: 3

Assessment: Regular assignments

End-of-year Examination: One 3-hour examination

Description: The first part of the course deal with classical mechanics and form a continuation from course 141. Lagrange equations are introduced and applied to various dynamical problems, including rigid bodies. The symmetric spinning top is treated in some detail. The course continues with an introduction to the methods of analytical dynamics developed by Hamilton. Small osciallations are treated. The course then provides an introduction to Quantum Mechanics. Topics covered: Uncertainty Principle X and P representation: Heisenberg and Schordinger picture: one dimensional harmonic oscillator and one dimensional potential problems including and scattering and bound state problems.

The course then provides an introduction to special relativity, the general and special Lorentz transformations, kinematics of special relativity with applications and relativistic mechanics.

Objectives: Introduction to Lagrangian and Hamiltonian mechanics, Introduction to quantum mechanism and to special relativity.

Textbooks:
Classical Mechanics H. Goldstein/*Classical Mechanics* L.D. Landau and E.M. Lifshitz
Variational Principles of Mechanics C. Lanczos
Special Relativity W. Rindler (Oxford Science Publications 2nd edition (1991))
Special Relativity A.P. French (The M.I.T. Introductory Physics Series).
June 10, 1998

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