

3. Lee, B.S. *Getaran dan Gelombang*, USM, 1989.
4. Jenkins, F.A. & White, H.E. *Fundamentals of Optics* (4th Ed.), McGraw-Hill, 2001
5. Chatar Singh. *Optik*, USM, 1991.
6. Hecht E. *Optics*, Addison-Wesley, 2001.

ZCT 104/3 Physics IV (Modern Physics)

Special Relativity: Reference frames, invariance of Newton's dynamics. Galilean transformation, invariance for other laws. Michelson-Morley experiment. Postulates of special relativity. Lorentz transformation. Relativistic kinematics and dynamics. Einstein formula.

Introduction to modern ideas in Physics: Blackbody radiation, Planck's law. Photoelectric effect, Compton effect, X-rays. Wave-particle duality, de Broglie waves. Old atomic models. Alpha-scattering, Rutherford model. Old quantum theory and the Bohr model of the atom. Energy levels of the atom and atomic spectra. Excitation and the Franck-Hertz experiment. Bohr's Correspondence Principle.

Course Expectation:

After completing this course students should

- (i) Understand the historical development of special theory of relativity and quantum theory during the early years in the 21th century.
- (ii) Understand the basic ideas in special theory of relativity and quantum theory
- (iii) Understand the conceptual differences between classical physics and modern physics in modeling the law of physics.

Be prepared for more advanced course in quantum mechanics.

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| Ref. Books: | <ol style="list-style-type: none"> 1. Concepts of Modern Physics, 6th ed. by Athur Beiser, McGraw-Hill (2002). 2. Modern Physics, 2nd ed., by Kenneth Krane, John Wiley & Sons (1995) 3. Modern Physics, 3rd ed., by Serway, Moses and Moyer, Thomson (2005). |
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