

Modern Optics and Photonics

- Instructor: Professor Yasuo Tomita, room W1-205 (x. 5164)
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- Prerequisites: A good understanding of introductory electromagnetics and linear systems theory may be helpful.

- Texts and references: The following book will be used as a textbook:

– F. Graham Smith and Terry A. King, *Optics and Photonics*, Wiley, New York, 2000.

Instructor's notes will also be provided if necessary. Materials will be taken from the following optional textbooks as well:

– A.Yariv, *Optical Electronics in Modern Communications*, Oxford Univ. Press, Oxford, 1997.

– B.E.A. Saleh and M.C. Teich, *Fundamentals of Photonics*, Wiley, New York, 1991.

– E. Hecht, *Optics*, 4th ed., Addison-Wesley, New York, 2001.

- Course Description: (See <http://talbot.es.uec.ac.jp/optics.html>)

This is an introductory-level course in the ever-increasing field of modern optics. It includes ray- and wave-descriptions of light propagation and image formation with coherent light. An introduction to holography and optical information processing is also given as an example of parallel and multi-dimensional data handling capabilities of light. Furthermore, it contains discussions of photonic devices (such as lasers, amplifiers, light modulators and detectors) and fiber-optic communications systems.

Topics in 90-minute lectures will include:

1. Preliminaries (Concept of waves and their mathematical expressions)
2. Wave optics
3. Fourier optics
4. Electromagnetic and crystal optics
5. Guided-wave and fiber optics
6. Introduction to fiber-optic communications

- Grading policy

The grades will be based 20% on the homework, 30% on the mid-term exam and 50% on the final exam.