



## Department of Physics Indian Institute of Technology Kanpur

### PHY 307 Modern Optics 2023-2024, Semester – II

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**Instructor:** Prof. R. Vijaya      **Office:** SL 217, Tel: 7552      **e-mail:** rvijaya@iitk.ac.in

**Schedule of lectures:** as per DOAA site      **Room:** as per DOAA site  
(Any meetings for discussion are to be requested by e-mail)

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#### **Reference texts:**

A single text-book will not address all the topics of the course. Please refer to these books and any other resources (such as tutorial papers) for getting the proper perspective:

1. Eugene Hecht, *Optics* (Addison-Wesley)
2. Ajoy Ghatak, *Optics* (Tata McGraw-Hill)
3. G. R. Fowles, *Modern optics* (Dover)
4. Max Born and Emil Wolf, *Principles of Optics* (Cambridge Univ Press)
5. J. R. Meyer-Arendt, *Introduction to Classical and Modern optics* (Benjamin Cummings)
6. Joseph W. Goodman, *Introduction to Fourier Optics* (Roberts & company)
7. Any other references suggested during the class for emerging topics.

#### **Detailed course contents:**

The purpose of this course is to convey an understanding and appreciation of the relatively new topics in Optics that have gained importance in the last few decades. Some experimental demonstrations will be shown to complement the theoretical understanding. Tentative plan is as follows:

1. Basics of EM theory, Maxwell's equations, Wave equation and solutions
2. Sources of light - conventional and Lasers
3. Controlling of light
  - o Polarizing and depolarizing light
  - o Diffraction – to understand the resolution of eye / microscope / telescope
  - o Optical image processing
  - o Guided light
4. Measurements in optics
5. Emerging topics – Slowing down light, metals for optics, meta-optics.

#### **Course plan (tentative):** (assuming lectures of 50 minutes duration)

Topic 1: 2 lectures  
Topic 2: 6 lectures  
Topic 3: 4 lectures for each sub-topic  
Topic 4: 6 lectures  
Topic 5: 3 lectures for each sub-topic

#### **Evaluation (tentative):**

Quizzes: 30%  
Mid-semester examination: 30%  
End-semester examination: 40%  
Pass grade requires a minimum of 30% at the end of the course.

**Attendance:** Compulsory. Attendance will be monitored on a regular basis. Prolonged absence without a justified reason may lead to de-registration.

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