

# Electromagnetic Waves in Optoelectronics, IPT 524000

**Time: W3W4F3** (10:10AM-12:00PM, Wednesday; 11:10AM-12:00PM, Friday), at Room **210**, EECS bldg.

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(Dated: Fall, 2008)

- **Course Description:**

- Fundamental concepts for Electromagnetic Waves in Optoelectronics, including the mathematical methods, physical concepts, device ideas, and simulation techniques.
- Extensions and applications of these basic concepts to update research fields will also be addressed.
- This semester I would focus more on the theory of diffraction.
- Although this course is given primarily for the first year graduate students, those who are undergraduates or senior graduates are encouraged to take this course.
- Background: Electromagnetism I, II.

- **Text Books and References:**

[Ref.]: Hermann A. Haus, "*Waves and Fields in Optoelectronics*," Prentice-Hall (1984).

[Ref.]: Hartmann Römer, "*Theoretical Optics*," Wiley-VCH (2005).

[Ref.]: Max Born and Emil Wolf, "*Principles of Optics*," 7th Edition, Cambridge (1999).

- **Teaching Method:**

in-class lectures with some studies on several journal papers

- **Syllabus:**

1. Introduction, 9/17, ~~9/19~~.
2. Maxwell's equations, 9/24, 9/26.
3. Crystal Optics, 10/1, 10/3, 10/8, ~~10/10~~, 10/15.
4. Modulators, 10/17, 10/22, 10/24.
5. Nonlinear Optics, 10/29, 10/31, 11/5, 11/7.
6. Midterm exam, ~~11/14~~, 11/14, ~~11/19~~.
7. Geometrical optics, 11/21, 11/26, 11/28.
8. Coupled-mode theory, 12/3, ~~12/5~~, 12/10.
9. Diffraction theory, 12/12, 12/17, 12/19.
10. Holography, 12/24, ~~12/26~~.
11. Coherence theory, 12/31, ~~1/2~~, 1/7, 1/9.
12. ~~Scattering theory.~~
13. ~~Quantum optics.~~
14. Final exam, 1/14.

- **Evaluation:**

1. Four Homeworks, 40%;
2. Two Exams: one midterm exam, 30%, and one final exam, 30%;
3. Bonus: just rise your hand in the classroom, 20%.

- **Office hours:**

1:00-2:00PM, Wednesday at Room 523, EECS bldg.

- **Website:**

For more information and course slides: <http://mx.nthu.edu.tw/~rklee>

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