



Course Syllabus

VE 507 Semiconductor Optoelectronic Materials

Course Description:

Introduction to semiconductor optoelectronic materials and the underlying physics principles, including band structure theory, optical processes in semiconductors, and quantum confined materials. Frontier research topics and non-semiconductor materials will also be discussed.

Instructor:

Name: Tian Yang
Email: tianyang@sjtu.edu.cn
Office: Room 422

Textbook:

S.L. Chuang, "Physics of Photonic Devices", 2009.

Additional Reference

Amnon Yariv and Pochi Yeh, "Photonics: optical electronics in modern communications", 6th ed, Oxford University Press, 2007.

Course Prerequisites:

VE 434 Principles of Photonics, VE 540 Applied Quantum Mechanics I and VE 504 Solid State Physics, or permission of instructor.

Grading Policy (Assignments %, Project, Exams, etc.):

Homework and class performance 20%, presentation 20%, final exam 60%.

Teaching Schedule:

1. Principles of lasers

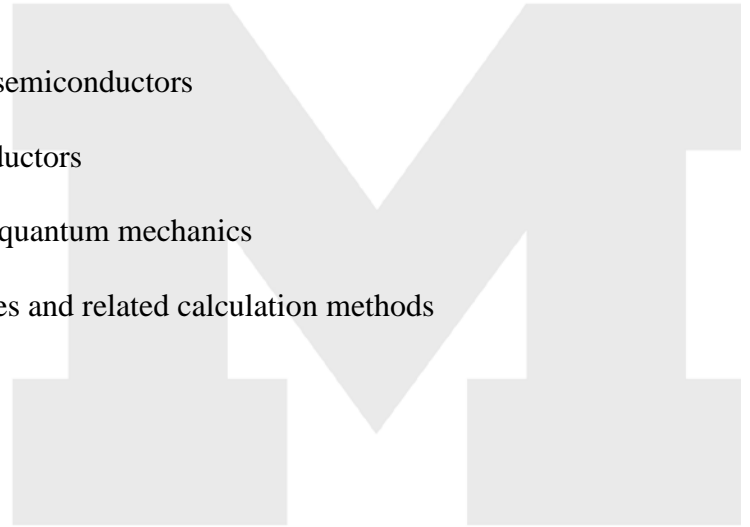
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2. Basic semiconductor electronics, crystal structures and growth methods
3. Introduction to optical processes in semiconductors
4. Review of quantum mechanics
5. Quantum theory of electronic band structures in semiconductors
6. Quantum theory of optical processes in semiconductors
7. A simple semiconductor laser model based upon quantum mechanics
8. VCSELs, DFB lasers, photonic bandgap structures and related calculation methods
9. Electro-optic modulation
10. Electro-absorption modulation
11. Photodetectors
12. Metamaterials



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