



PHOT 222: Quantum Photonics

LECTURE 00

Michaël Barbier, Spring semester (2024-2025)

COURSE INFORMATION

Instructor

Dr. Michaël Barbier

e-mail: michaelbarbier@iyte.edu.tr

Office: door on the right of Z5

Office hours: Friday 11:00 – 13:00
(or via appointment)

Teaching Assistant

Yağız Oyun

e-mail: yagizoyun@iyte.edu.tr

Office: Z9B

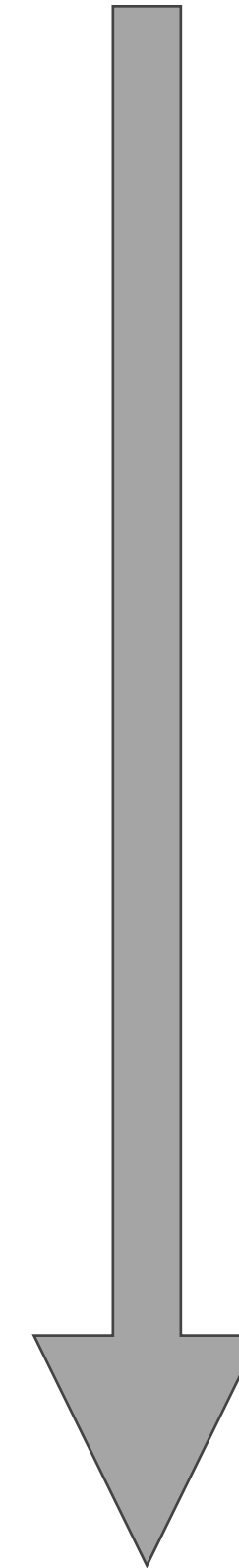
Office hours: TBA

Course Schedule

Tuesday	10:45 – 12:30	Building F, lecture room D3
Friday	8:45 – 10:30	Building F, lecture room D3

CONTENTS OF THE COURSE

- Relativistic effects
- Quantum mechanics of light and matter: de Broglie, Blackbody radiation, Photoelectric effect, ...
- Quantum particles in potentials and tunneling
- Electronic structure of many-electron atoms
- Spectra of molecules &
Band structure of crystalline materials



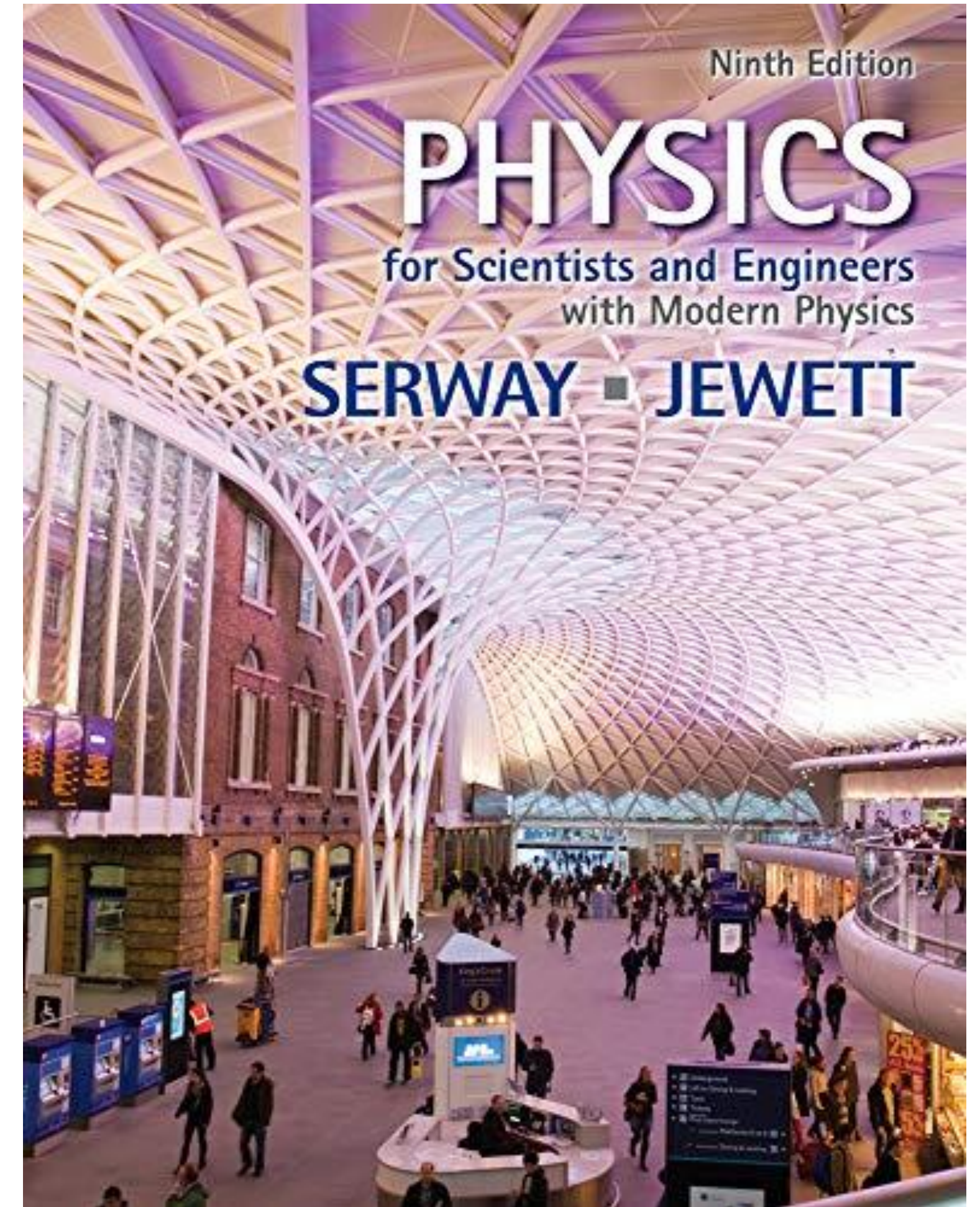
COURSE MATERIALS

Course book

**R. A. Serway and J. W. Jewett,
Physics for Scientists and Engineers
with Modern Physics, Part 6,
9th edition (2013),
Cengage Learning**

Supplementary material

Beiser, Concepts of modern physics,
McGraw-Hill



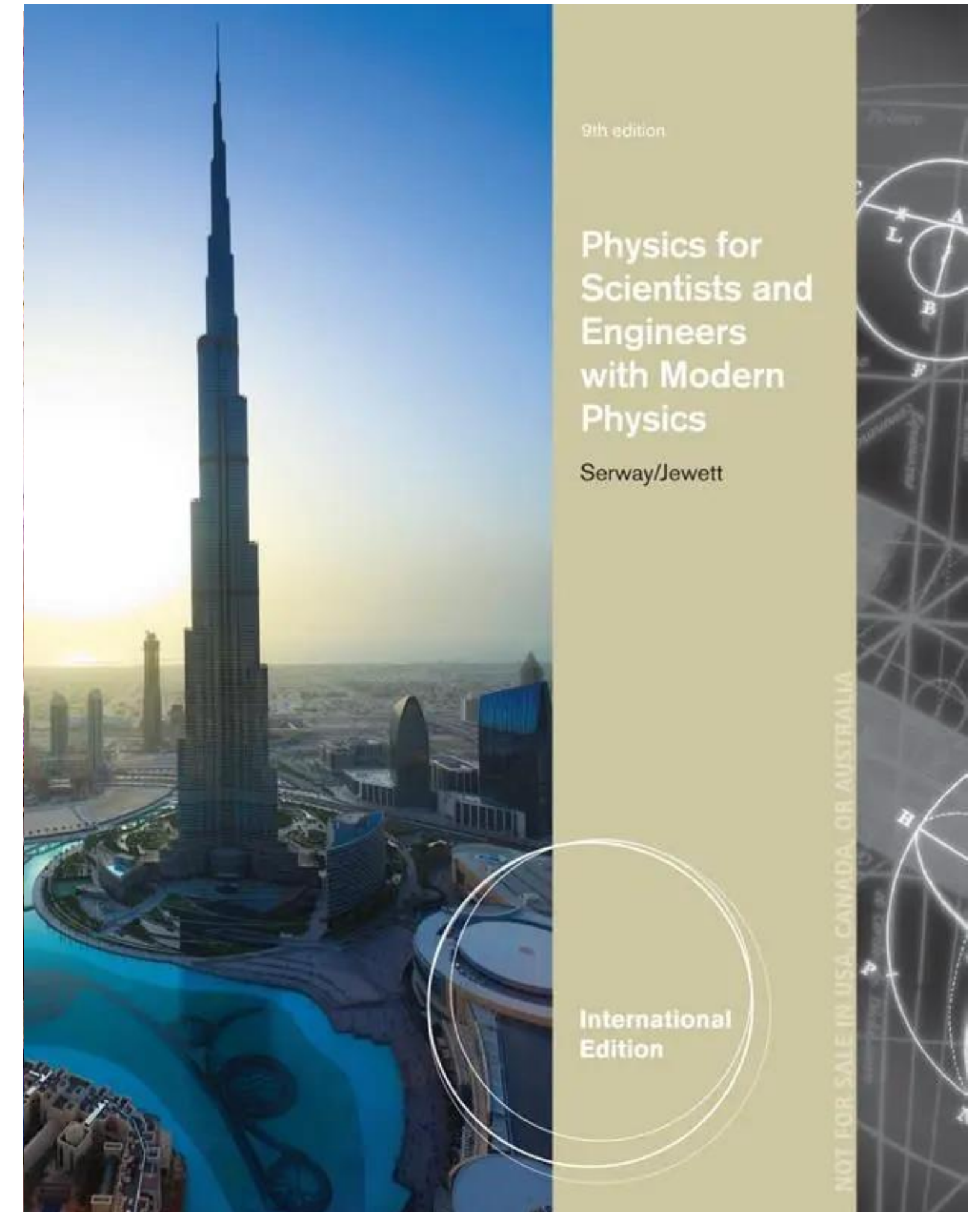
COURSE MATERIALS

Course book

**R. A. Serway and J. W. Jewett,
Physics for Scientists and Engineers
with Modern Physics, Part 6,
9th edition (2013),
Cengage Learning**

Supplementary material

Beiser, Concepts of modern physics,
McGraw-Hill



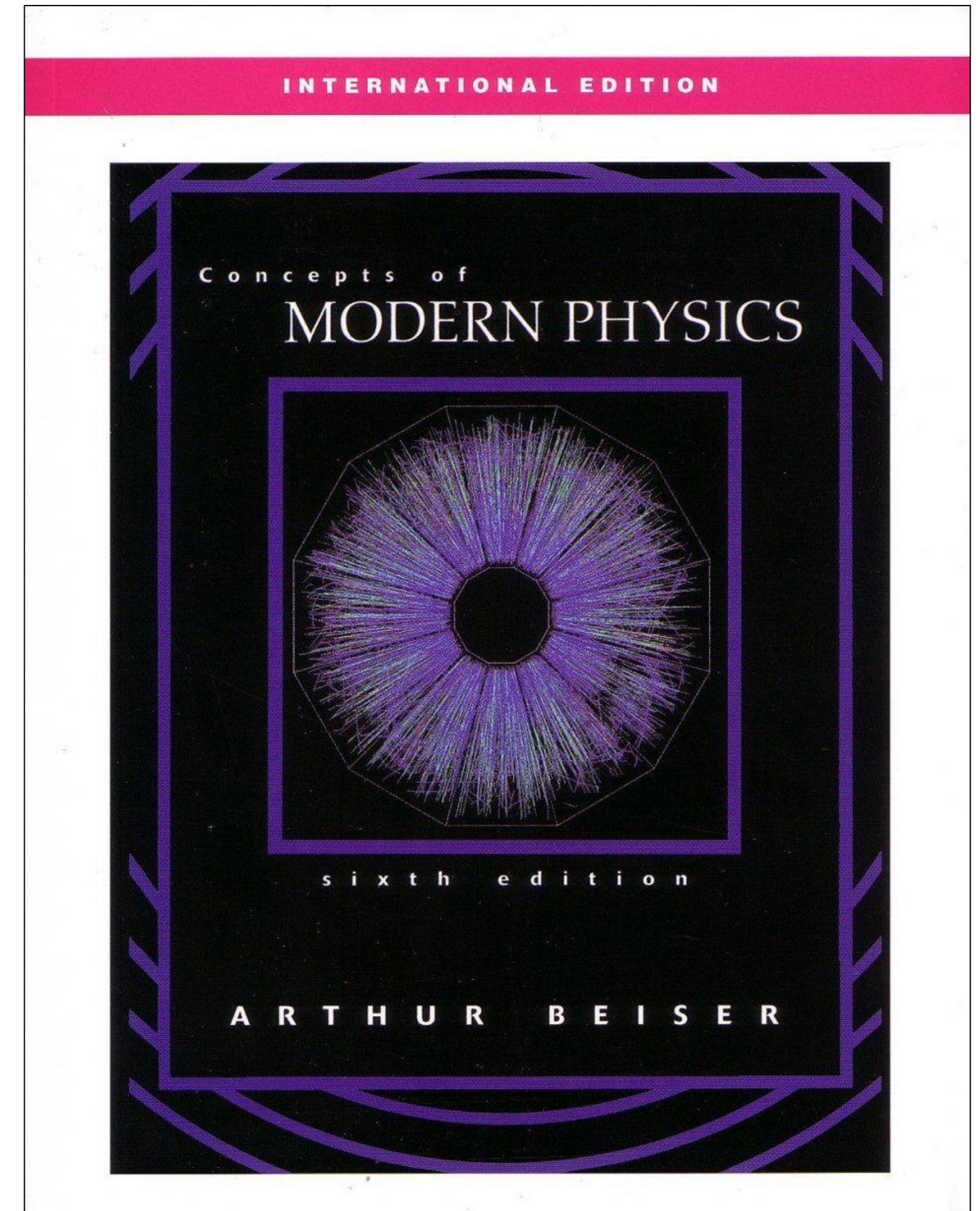
COURSE MATERIALS

Course book

R. A. Serway and J. W. Jewett,
Physics for Scientists and Engineers
with Modern Physics, Part 6,
9th edition (2013),
Cengage Learning

Supplementary material

**Beiser, Concepts of modern physics,
McGraw-Hill**



COURSE MATERIALS

Online Supplementary Material

[QuVis](#): Web site with quantum mechanics visualizations and simulations for educational purposes

Applet(s) by Paul Falstad for [1D quantum systems](#) (other applets available on www.falstad.com/)

[PhET: collection of Interactive Simulations](#) by the University of Colorado. See e.g. their [Quantum tunneling of wave packets applet](#)

Course on [Modern Physics by Michael Fowler](#) from the University of Virginia

Further course information on [Michaël Barbier's webpage](#).

OVERVIEW OF THE COURSE

week	topic
Week 1	Relativity
Week 2	Waves and Particles
Week 3	Wave packets and Uncertainty
Week 4	The Schrödinger equation and Probability
Week 5	Midterm exam 1 on Wednesday, March 19 at 10:45
Week 6	Quantum particles in a potential
Week 7	Harmonic oscillator
Week 8	Tunneling through a potential barrier
Week 9	The hydrogen atom, absorption/emission spectra
Week 10	Midterm exam 2 on Friday, April 25 at 8:45
Week 11	Many-electron atoms
Week 12	Pauli-exclusion principle
Week 13	Atomic bonds and molecules
Week 14	Crystalline materials and energy band structure

COURSE SYLLABUS AND CLASS WORKFLOW

Exams

- Midterm exam 1: 20 %
- Midterm exam 2: 20 %
- Final exam: 60 %

Examination Dates (tentative)

- Midterm exam 1: Wednesday, March 19 at 10:45
- Midterm exam 2: Friday, April 25 at 8:45
- Final exam: TBA