

## Atomic, molecular, and optical physics

**Instructor:** Oksana Ostroverkhova, oksana@science.oregonstate.edu

**Textbooks:** *Physics of Atoms and Molecules* (2<sup>nd</sup> Ed.) by B. H. Bransden and C. J. Joachain and *Quantum Optics* by M. Fox (Oxford Press, 2008; also available in e-format for download from the OSU library)

**Office hours:** Weniger 413, upon request or stop by

**Course outline:**

One-electron atoms and their interaction with external fields.	(B&J Ch. 3-6, F Ch.7)	week 1-2
Two-electron atoms.	(B&J Ch. 7)	week 3
Multi-electron atoms and their interaction with external fields.	(B&J Ch. 8-9,16)	week 3-5
Molecules. Molecular spectroscopy.	(B&J Ch. 10-11)	week 6
Lasers. Laser spectroscopy.	(B&J Ch. 15)	week 7
Quantum optics. Strong coupling	(F Ch.9)	week 8
Quantum cryptography, computing, teleportation	(F Ch.13-15)	week 9-10

**Homework:**

Homework will be handed out every week. Solutions should be turned in at the beginning of the class on the due date, unless specified otherwise. Late homework will not be accepted since the homework solutions will be available immediately after the due time.

**Worksheets:**

In order to help you check your understanding of the material and provide feedback for me, worksheets will be handed out at most lectures for in-class work. Filled out worksheets will be collected, graded, and returned at the next class.

**Presentation:**

We will break into groups of two (one group could have three people if we have an odd number of people in the class), and each team will prepare a 12-18 minute presentation (6 minutes per presenter) based on the modern literature overview of your favorite AMO-related topic. During the last two classes of the term we will have a research symposium where everyone will present and answer questions from the audience. A list of suggested topics to choose from will be provided, but you can choose any AMO-related topic (e.g. that closely related to your own research !). Please let me know the topic of your presentation by week 5; more instructions on the presentation and the symposium will be provided later.

**Exams:**

We will have one in-class midterm (tentative date May 8) and a final exam (Wednesday, June 12 at 2 PM).

**Grading Policy:**

Homework (total)	20%
Worksheets (total)	10%
Presentation	20%
Midterm	20%
Final	30%