

MODERN PHYSICS. Summer 2020**Instructor:** Artem G. Abanov**Web page:** <http://faculty.physics.tamu.edu/abanov/>**email :** abanov@tamu.edu**Office:** MPHY 415**Office Hours:** email any time. Zoom office hours on Wednesdays 1pm.**Text:** Book for the course (recommended).

- Modern Physics, by Serway, Moses, and Moyer

Grading:

1 exam	30%
Final (comprehensive)	30%
Homework (weekly)	40%

Exam schedule:Exam on **Wednesday, July 8, 10:00-11:35 am;**Final exam: **Tuesday, August 4, 10:30am – 12:30 p.m.;****Prerequisites:** PHYS 208 with minimum grade of D, and MATH 308 (or current enrollment therein)**Syllabus:**

- **Classical:** Different formulations, role of symmetries, Maxwell equations, gauge invariance, structure of space-time.
- **Relativity:** Michelson-Morely experiment, time dilation, length contraction, relativistic Doppler shift, relativistic velocity addition, invariant spacetime intervals, relativistic energy and momentum, mass-energy equivalency, introduction to general relativity.
- **Introduction to Quantum Mechanics:** blackbody radiation, Planck distribution, quantization of light, photoelectric effect, Compton scattering, wave/particle duality, Millikan's experiment, Rutherford atomic model, Bohr atomic model, quantization of angular momentum.
- **Quantum Mechanics:** De Broglie relation, matter waves, Heisenberg uncertainty principle, 1-D Schrödinger's equation, infinite square well potential, simple harmonic oscillator potential, operators, quantum tunneling, 3-D Schrödinger's equation & atomic hydrogen, angular momentum coupling, Pauli exclusion principle, periodic potential.
- **Statistical Physics:** entropy, partition function, Fermi-Dirac and Bose-Einstein distributions, Bose-Einstein condensate, electrons in metals, superconductivity and superfluidity.
- **Nuclear and Sub-nuclear Structure:** nuclear properties, binding energy and nuclear force, liquid-drop model, radioactivity and nuclear decay, introduction to particle physics.

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