

MIDTERM # 1 TOPICS

- AC Circuits (Ch. 36)
 - Phasors – Meaning of Vector addition
 - Comment: **Make sure you understand convention on rotation – ccw. Equivalence of sin and cos generator voltage**
 - Capacitor circuits – Capacitive Reactance (Fig. 36.10)
 - High and low pass filters
 - Inductor circuits – Inductive Reactance (Fig. 36.15)
 - **RLC Circuits – Resonance and its meaning**
 - Power in AC circuits – Average power
 - Power and average power in resistors – Average power in capacitors and inductors (p. 1129, Fig. 36.23)
 - **The power factor (eqs 36.44 and 36.45)**
- Wave Optics (Ch. 22)
 - Models of light and range of validity (eqs 22.26 and 22.27)
 - **Interference – Young's double slit experiment and analysis – Intensity pattern – Multiple slits – Diffraction grating *******
 - **Single slit diffraction – Analysis (Condition for destructive interference) – Width of bright pattern and scaling (Eq. 22.22)**
 - **Combine multiple and single slit diffraction**
 - Skip Michelson- index of refraction and holography

- Ray Optics (ch. 23)
 - Ray diagrams – apertures – Understand Fig. 23.6 and stop to think 23.1
 - **Reflection and mirrors**
 - Refraction, Snell's law, Fermat's principle
 - Total internal reflection – Fibers
 - Image formation by refraction
 - Object and image distance, optical axis, paraxial rays
 - Looking at a swimming pool, mirage – Fermat's principle
 - Color and dispersion
 - How filters work (reflection vs. absorption)
 - Rayleigh scattering – Blue sky , red sunsets
 - Ray tracing for thin lenses – Real and virtual images
 - Focal point and focal length – Diverging and converging lenses
 - Special rays for image formation
 - Lateral magnification
 - Skip section 23.7
 - Spherical mirrors (23.8) concave- convex – real and virtual images

- **Section 24.5 Resolution of optical instruments**
 - **Diffraction limits (eq. 24.13) – relation to single slit diffraction**
 - **Raleigh's criterion (eq. 24.14)**

- **Modern optics**
 - **Continuous vs. discrete spectrum**
 - **Balmer and Hydrogen atom**
 - **X-ray diffraction – Bragg condition**

General Exam Suggestions:

- You should be able to complete every problem
 - If you are confused ask
 - If it seems too hard, you are not thinking enough
 - Look for hints in other problems
 - If you are doing math, you are doing too much
- Read directions and problem completely (before & after)
- Write down what you know before starting
- Draw pictures, define (label) variables
 - Make sure that unknowns drop out of solution
- Don't forget units when they are needed

What you should study :

- Review HW problems and solutions
- Review Chs 36, 22, 23, 24.5 and 25 and Chapter Summaries
- Review Supplements and Summaries
- Review Examples of Solved Problems

Exam Policy – From Web Site

All exams are closed book. A single 4x6 index card will be allowed for each midterm exam. **No calculators with memory or wireless communication are allowed. If you bring such a calculator to an exam, you will not be allowed to use it.** The exams will be full duration of the allotted time of the lecture, 1 hour and 15 minutes. The exams will include numerical constants you may need. Make-up exams will only be given under extraordinary circumstances, in which case an oral exam will be conducted. If you have a good reason that you cannot attend an exam, please talk to me before the exam so we can arrange for an oral exam to be given on an alternate date.

Please inform me on any disability accommodations needed and religious observance a few days before the exam