

## 3306 physics lectures, Spring 2026

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[https://www.physics.smu.edu/saptarnab/PH3306\\_Spring\\_2026/](https://www.physics.smu.edu/saptarnab/PH3306_Spring_2026/)

Based on Simon Dalley's lectures delivered in spring 2025



**WARM UP 17-21: Interference (Halliday 35.1 & 35.3), Films & Interferometers (Halliday: 35.4 & 35.5), Diffraction (Halliday: 36.1 & 36.3), Multiple Sources (Halliday: 36.4 & 36.7), and Black Bodies (Halliday: 38.4 & 44.4)**

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*Write your answers in the space following the warm-up question if you can. Write as if you are explaining to a fellow student. If you need more space, you are probably over-thinking things.*

**Who had one of the first wave theories of light and who was one of the first to prove experimentally that light is a wave?**

**What does “coherence” mean?**

**What are the path length differences between sources of coherent monochromatic light that give rise to constructive and destructive interference?**

**Explain why the intensity of interference between two sources of coherent monochromatic light depends on half the phase difference between their paths?**

**Why do rainbows rarely appear to you on rainy days?**

**How thin does a film have to be for the purposes of interference?**

**Give some examples of thin film interference.**

**Explain how an interferometer works.**

**Where were the first gravitational waves detected using interferometers?**

**Why do the edges of objects not cast a sharp shadow?**

**How do dark regions appear at certain angles beyond a single aperture illuminated with monochromatic light?**

**Sketch (not plot) the intensity graph for monochromatic light passing through a single narrow slit.**

**What is the Rayleigh criterion for resolution?**

**What is the relationship between the slit width and the separation between slit centers under which the single-slit diffraction pattern forms an envelope to the double-slit interference pattern?**

**In words, why does the total number of lines (which may be slits or lines of reflection) in a diffraction grating not affect its dispersion?**

**In words, why does the distance between lines in a diffraction grating not affect its wavelength resolving power?**

**When X-rays are “reflected” by a crystal of known unit cell, for example common salt (NaCl), what can this usefully determine?**

**Is a black body black? Explain.**

**What is the “ultraviolet catastrophe” of black-body radiation and how is it avoided?**

**Sketch the curves (on the same graph) of intensity against wavelength for black bodies of different temperatures. Be careful to label and put a scale for the axes.**

**Explain what the Cosmic Microwave Background is.**