

Study Guide 2

Week 2 10/29 – 11/2	Homework due 11/6 (Tues)
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READINGS: Quimby, Chapters 3 and 4

Ch. 3: We will begin our discussion of optical waveguides with the planar geometry, because it is mathematically simple. We will find that light cannot propagate in any arbitrary way inside a waveguide, but instead must be confined to a discrete set of *modes*. Developing a quantitative and intuitive understanding of waveguide modes will be an important part of this material. Key concepts include the *effective index*, the *mode chart*, and the *light distribution in a mode*. In this chapter we also see the first example of light spreading, or *dispersion*, in a waveguide.

Ch. 4: Here we show how some of the concepts developed in the previous chapter for planar waveguides can be extended to the 2-D optical waveguide, or optical fiber. One key concept is the *acceptance angle* for light entering a fiber, and how this is related to the fiber's *numerical aperture*. Other important concepts examined here are the *number of modes* in a fiber, the condition that only one mode will propagate (*single-mode fiber*), the *optical fiber mode chart*, and the *light intensity distribution* in a single-mode fiber.

PROBLEMS: Ch. 2, problem 15

Ch. 3, problems 3, 4, 8, 9, 10, 11

Ch. 4, problems 3, 6, 7, 10, 11