

Sample Lesson Plan

DAY 1 50 min	<p>Present the material included in the background information for this unit. Specifically, discuss the nature of light and some of the properties it exhibits, including reflection, interference, and diffraction.</p> <p>Here are two suggestions for conveying an understanding of interference:</p> <ol style="list-style-type: none">1. Included in Appendix F are two circular wave patterns emanating from point sources from which overheads can be made. As the two overheads are superimposed, the wave patterns interfere with one another and the regions of constructive and destructive interference become quite obvious as lighter and darker lines, respectively, that radiate away from the two sources.2. Borrow a signal wave generator and two speakers from the physics department. Set the speakers on either end of the demonstration table and connect them to the generator. Select a “comfortable” tone and have the students walk back and forth across the room at varying distances from the speakers. Instruct them to locate regions where the sound is louder (the waves are constructively interfering) and softer (the waves are destructively interfering). If you have them stop in these “dead” spots and map their location relative to the speakers, they will notice that they are standing in straight lines that radiate away from both speakers in the same way that was illustrated by the overheads.
DAY 2 35-40 min	<p>Discuss diffraction in some detail. It might be a good idea to issue ordinary diffraction gratings to the students and have them look at a light source (incandescent, fluorescent, gas discharge tubes, or a LED).</p> <p>Make sure they are aware of the “rainbow” of colors produced by the incandescent source (a topic of discussion at another time) and particularly the series of bright lines and dark spaces produced by the other sources.</p>
10-15 min	<p>Pre-lab Investigation 1. Emphasize that the students are now going to see how the property of diffraction may be used as a tool to discover the existence of certain patterns or arrangements of atoms within materials.</p>
DAY 3 50 min	<p>Have the students do Investigation 1.</p>
DAY 4 25 min	<p>Discuss the results of Investigation 1. Since it is critical that the students have “good” data, show overheads of the figures included in the</p>

“Notes for the Instructor” for this investigation or use a pocket laser and display the patterns as a demonstration.

25 min

Have the students begin Investigation 2.

DAY 5

50 min

The students should finish Investigation 2. You should also discuss their results thoroughly (See “Notes for the Instructor” for this investigation).

- DAY 6**
50 min
- During this class discussion, emphasize that what students have done so far is to investigate a technique for the collection of indirect evidence about shapes that may be contained within a material. What is needed is direct proof for the existence of those patterns. This should lead into a discussion of the theory behind scanning probe microscopy (SPM). The background information and several of the Appendices deal with this and related topics.
- DAY 7**
50 min
- Have the students do Investigation 3.
- DAY 8**
50 min
- Discuss Investigation 3 and have the students begin Activity 1. Depending upon your technology resources, arrangements for LMC/computer lab time will need to be made in advance. Many students will be able to complete this assignment outside of class time.
- DAY 9**
50 min
- The students should continue with Activity 1, and the worksheet should be completed by the end of this period.
- DAY 10**
- Unit exam.