Name: _____ Date: _____ Period: _____

Science Classes and Instructors

Objectives

When you have read this chapter, you will be able to answer these questions:

1. What are the components of most science courses?
2. How might lecture information be organized?
3. What are the different teaching styles of instructors, and how can I adapt my learning style to each?
4. What is a course syllabus, and how should I use it?
5. Other than class time, is there anything else to help me learn the information?
6. Should I ask questions, and does class participation count?

Your life experience might not give you a clue as to what a science course is about. Thus, you may think taking a science course is riskier than taking other courses. Part of the challenge is learning the organization of a science course and understanding the style and expectations of the instructors.

How Are Science Courses Organized?

In most schools science is taught in a traditional way. Introductory science courses are composed of lecture, laboratory, and in some cases, recitation classes (figure 2.1).

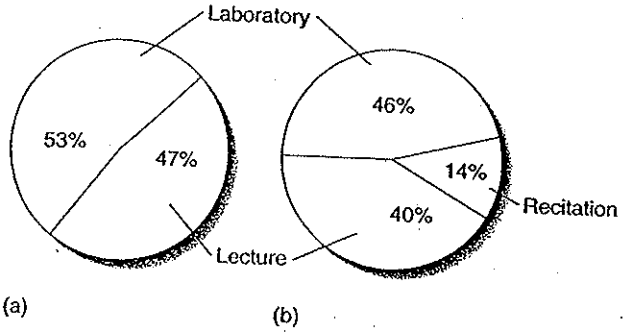


Figure 2.1 An example of a science course. (*a*) This pie graph indicates that lecture occupies 47% and laboratory 53% of total course time. (*b*) If the course includes the three types of classes, recitation occupies 14%, lecture 40%, and laboratory 46% of course time.

Lecture

The bulk of the course content is presented during the lecture by instructors. Instructors use a variety of presentation methods including overhead transparencies, blackboards, photographic slides, and computer projections. The common theme to all these visual aid methods is that key ideas, concepts, and brief outlines are written in the presentation. The main body of the lecture discusses the relationships between these recorded points. *Notes* must be taken on the *discussion* as well as on what is recorded on the *board.* Instructors may also use a variety of other visual aids such as videodiscs, and computer-simulated exercises to present figures and concepts from the textbook. As figures are projected, be sure to record the figure number and make notes on the information described in the visual aid. If lecture notes are provided by the instructor or posted on your course's website, it is still important that you actively read, follow, and supplement these notes before, during, and after the lecture. Note-taking can be an active way to learn information and is a challenging skill to learn. Hints for note-taking are discussed in chapter 5 (Listening and Taking Notes).

Lectures, textbooks, and computer software are organized in a number of different ways. It will help you to listen, read, take notes, and learn if you recognize these patterns. These resources will use different organizational approaches at different times. The following patterns have been organized in outline form. (Creating an **outline** is an important study skill. Note the numbering and indentations of the outline.)

Types of Organization[1]

A. Chronological (in time)
   1. Sequence in which subject was seen or discussed.
      Example: Study of the atom.
   2. Sequence in which the subject was (is) accomplished.
      Example: A laboratory experiment or the solution to a problem.
   3. From cause to effect.
      Example: Radiation causing mutations or cancer.

B. Spatial
   1. What is next to what.
      Example: Different strata of rock in the Grand Canyon.
   2. What is connected to what.
      Example: Description of the digestive system.

C. From general to specific.
   1. Theoretical to practical.
      Example: $F = md$, Work of pulley systems.
   2. General topic to examples.
      Example: Function and nature of enzymes or catalysts to discussion of pepsin or platinum.

D. From least to most (or most to least).
   1. Small to large.
      Example: Atom to biosphere.
   2. Weak to strong.
      Example: Chemical bonding.
   3. Simple to complex.
      Example: Discussion of tissues or the structure of atoms.
   4. Least controversial to more controversial.
      Example: Discussion of origin of the universe.

Laboratory

Laboratories provide hands-on experience with the process of science. The information in the lab might or might not parallel that in the lecture, and the laboratory instructors might or might not be the same as the lecturer. Some laboratory instructors might just sit at the desk and answer questions, assuming that you are doing the work and understanding the material. Other instructors move around the lab room to check on your progress and participation. It is up to you to take the initiative to become involved in the lab work. Don't be afraid to call upon instructors for help. It is their job to answer your questions. However, it is a bit embarrassing to ask questions if you have not properly prepared for the class (see chapter 7, "Preview for Laboratory").

You will use laboratory manuals to guide your lab study. Don't sit back and watch your lab partners do all the work. If you do, you will find they will learn the material more easily than you will. Sometimes students with different styles of study and work have trouble working in the same laboratory group. This in turn could interfere with learning. If this problem arises for you, try to resolve it before it interferes with your learning.

It is **important to take notes** on what is covered in the **laboratory class.** If the instructor adds or clarifies information before you begin work on the lab, take notes on what is said!

Laboratory Books and Reports Some science courses might require you to record procedures and data in lab notebooks and to write laboratory reports (see chapter 12). Careful and organized record-keeping is part of the laboratory exercise. These requirements are reviewed during the first laboratory period. If the requirements are not clear, ask questions. Clarifying what is expected is not stupid; it is smart. The following are things to keep in mind:

- Know what the instructor expects and requires.
- Observations and data should be recorded neatly.
- Graphs, tables, and diagrams should be clearly labeled with captions and units.
- All calculations must be shown.
- Incorrect data or calculations should be crossed out with one line. Don't tear out pages or blot out work.
- Written work (analysis and conclusions) should be concise.
- Hand in work on time; don't let work pile up.

Recitation/Tutorials

A recitation class is devoted to problem-solving or clarifying information from lecture and lab. Instructors will give assignments one week and review them the next. These activities may include time with computers in a computer lab or tutorial. Students might be asked to demonstrate how they solved the assigned problems. Some instructors give quizzes on lecture or laboratory information during recitation periods. These activities reinforce the content of the lecture and laboratory.

Types of Instructors

As a learner, you have a distinct *style of learning* (see chapter 3, Bridging the Learning Pyramid). Your instructor also

[1] Adapted from *Study Smarts* by Judi Kesselman-Turkel and Franklynn Peterson (Contemporary Books, Inc. 1981).

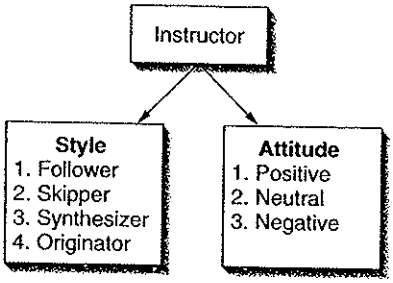


Figure 2.2 Instructors have different styles and attitudes.

has a distinct *teaching style.* Your instructor's style influences the way you listen, take notes, study, and learn. Sometimes, it may seem as though your personal learning style is incompatible with your instructor's style, and vice versa. Recognize that these seeming incompatibilities are not anyone's fault. Equally important to recognize is that there are things you can do to improve your success in the science course by adopting new skills. The first step to adapting to your science course is to identify your own style and the style of your instructor. An instructor's style of teaching can be categorized into one of four groups (figure 2.2): the follower, the skipper, the synthesizer, or the originator. During the semester, your instructor might shift from one style to another.

Here are descriptions of four instructor "styles" and suggestions for ways you as a student can adapt to them:

1. **Follower:** Follows the content of a textbook chapter-by-chapter, page-by-page, example-by-example.
   a. Bring your book to class so you can check the sections of material covered. You should take notes on any additions or clarifications of text material.
   b. You will find it easy to preview material before attending lectures. Your textbook with the checked material and notes are your guides to the material to be studied and learned.
2. **Skipper:** Follows the content of a textbook but skips around from one part of the book to another.
   a. The skipper's content might or might not be easy to trace in the textbook. It's important that you take notes to keep track of exactly what was covered and in what sequence.
   b. You will find it easy to preview material before attending lectures because assigned readings are probably given. For study purposes, your lecture notes are as important as the text.
3. **Synthesizer:** Draws on different parts of the textbook and on outside resources. All is synthesized into the lecturer's view of the science course. This view might introduce the same material as the text but in a completely different way.
   a. Lecture notes are very important because the topics cannot be quickly found in the text. Study of the notes and of similar information in the text helps solidify learning. Looking up key terms from lectures in the index of the textbook will help you locate information in your text corresponding to the lecture notes.
   b. This type of presentation will be difficult to preview unless the instructor indicates what areas will be covered in the lectures to come.
4. **Originator:** Presents information from a variety of sources, much of it originating from recent publications. Collections of readings might be important, rather than a single text. Independent study and research are expected.
   a. Note-taking is important as is study of assigned outside readings.
   b. If a textbook is recommended, you will probably use it as a reference.

Occasionally an instructor will assume the role of a **facilitator** in the learning process. The instructor helps students define the topics to be learned. Groups of students assume the responsibility of researching and mastering the topics. As this is accomplished, students then take on the role of teacher and teach each other and the entire class. This **collaborative learning** develops responsible academic and work attitudes and shifts educational responsibility to the learner (student). It is a nontraditional, but exciting, way of learning. However, instructors and students "born and raised" to traditional education are uncomfortable with this mode of learning.

All instructors also have a certain *attitude* about their jobs as teachers and about your job as a student. Some instructors display a very positive attitude toward teaching, an enthusiastic interest in the subject matter, and a sincere concern about whether or not you learn the subject. Other instructors are purely dispensers of information and seem to have a very neutral attitude toward their job, the subject matter, and you. Still other instructors are negative individuals; they are dissatisfied with their jobs and would rather be doing something else.

As discussed, you, as a student, have a certain *learning style.* You also have a certain set of attitudes that influence your learning. Your own style of learning might mesh well with your instructor's style of teaching, but if it doesn't, you will have to take steps to cope with the situation. It is your job to learn the material; the college educational system leaves it up to you to comprehend the subject matter. Some instructors make the material seem relatively easy and interesting; other instructors are sources of great frustration.

Course Syllabus and Requirements

Instructors hand out a course syllabus or announce that the syllabus and other materials such as course lecture notes can be found on the Internet. As the instructor reviews the syllabus, have a pencil or pen in hand, follow the review, and take notes. Re-read the syllabus as your first homework assignment. Compare the course outline in the syllabus to the table of contents in your textbook. Recite the topics you will study and reaffirm the requirements for the course. Place the syllabus in your notebook.

The syllabus generally includes the following:

1. Course objectives
2. Title of required textbook and manual
3. Statement of teaching approach
4. Course outline
5. Reading assignments
6. Grading method and values of tests, assignments, and other work
7. Attendance policy
8. Makeup procedures
9. Tutoring center information
10. Computer-assisted learning and website information

The syllabus is an important part of any class since it tells you course expectations and requirements. Your success in the course relies on knowing and understanding the course syllabus.

Questions and Participation

If you are an active learner, questions will come to mind as you listen in class or as you study. Don't stifle the question. Raise your hand and ask the question or write it down in the question column on the left-hand page of your notebook (see chapter 5). A questioning mind will help define what must be learned. If, for some reason, questions are not encouraged in lecture, be sure to record them in your notes and seek out the answers after class.

Participation in class may or may not be a factor in determining your grade. Just because you attend class does not mean you will pass the course. The course syllabus will give information about the role of class participation and attendance.

Grades

Scientific information will be presented in the classroom in a number of different ways. You are expected to learn the material and then demonstrate your comprehension of it. Your responses to tests and written reports result in a grade. You will develop certain feelings about the overall course of study. In the end, you will judge your overall level of satisfaction.

Final grades will be based on an average of test scores and graded assignments. The amount of effort and study time, class participation, and extra projects may be, but seldom are, part of the final grade (see chapters 12 and 13).

You will find that instructors expect you to find out what you missed if you were absent. Your absence does not excuse you from having to learn the material. Exchange telephone numbers with a few classmates so you can call them if you must miss class.

Where to Get Help

Instructor's Office Hours

Instructors generally are required to hold office hours. If you have questions about the course content or requirements, make an appointment to see the instructor. Before the appointment, write down the difficulties or questions you have. This will demonstrate that you've made an attempt to analyze your concerns and will lead to an effective and efficient meeting.

Learning Centers

Most colleges have organized tutoring services to assist you. Find out if a learning center is available for the science course you are taking. Tutors are usually graduate or undergraduate students qualified to help guide your study. As with instructors, their level of skill will vary. Generate questions before you seek their help. The questions will be a valuable way to start a tutoring session. In addition, you or your study group might find the center a good place to study.

Books, Laboratory Manuals, Study Guides, and Computer Resources

A textbook is a primary source of information to complement the presentation of the instructor. Your job as a student is to use the information in the textbook to reinforce the content of the lectures. The laboratory manual will describe the specific exercises you will perform. This manual will contain the bulk of the information you will need to learn in the laboratories.

Most publishers offer study guides to help students learn the information in the textbook. Computers are quickly becoming a popular way of offering study assistance to students. Likely, your textbook and course have websites that contain tutorial assistance, online "virtual" laboratories, web-links to other sites, and chapter-by-chapter exercises and interactive activities. You should listen to

your instructor's recommendation concerning the use of the study guides and other references or study aids.

Most textbooks, manuals, study guides, and computer resources contain more information than will be taught in the science course. An important study skill is learning how to identify the content you are expected to learn. Advice on the use of computers will be discussed later. Let the lectures and laboratories be your guide.

Review

1. Introductory science courses have lecture and laboratory classes each week. In addition to lecture and lab, some science courses also have a weekly recitation class.
2. Scientific information will be presented in the classroom in a number of different ways.
3. An instructor might be a follower, a skipper, a synthesizer, an originator, or any combination of these. How you take notes and how you study are influenced by the instructor's style.
4. Instructors have attitudes that influence their effectiveness as teachers. It is your job to comprehend course content regardless of the instructor's teaching style and attitude.
5. A course syllabus describes the course requirements and content.
6. The grades in the science course are based on your performance on various tests and graded assignments.
7. Use instructors and tutors to help you answer questions you can't resolve. Instructors and tutors are paid to help you.

Name: _____ Date: _____ Period: _____

Sciences Classes and Instructors

1. List you concerns about taking a science course. Discuss ways to decrease any potential anxieties.

_____

_____

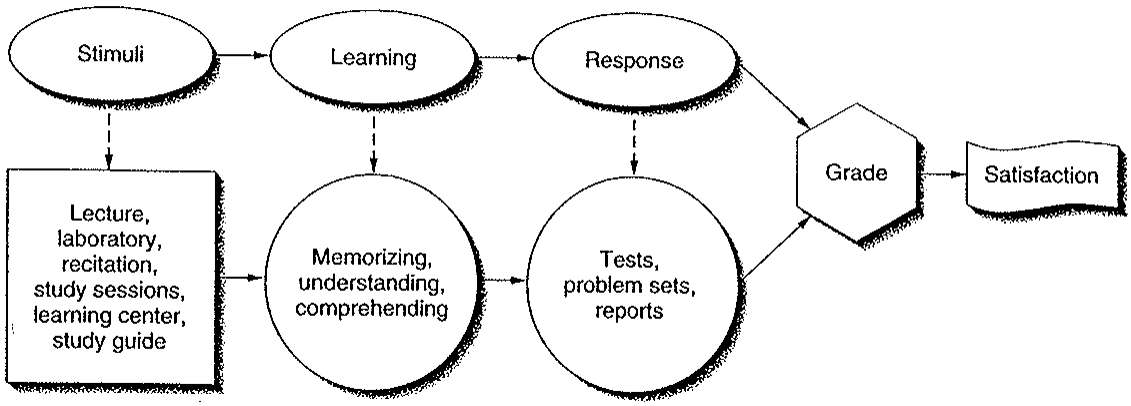
_____

_____

_____

_____

2. The flow chart below illustrates various components that will decide our course grade and ultimately your satisfaction in your science course. Describe this figure in short essay form.



_____

_____

_____

_____

_____

_____

3. During lecture, on what must you take notes?

_____

_____

4. What should you do if your lecture notes are provided by the instructor?

_____

_____

_____

5. During lab what is it your responsibility to take initiative to do?

_____

_____

_____

6. Should you take notes during lab? _____

7. List the four styles of instructors you might encounter. Which of these styles do you think will match your style of learning? Explain why you think this teaching style would match your learning style.

_____

_____

_____

_____

_____

_____

8. If you think the style of your instructor will clash with your style of learning, what three actions will you take to learn the science material presented?

_____

_____

_____

_____

_____

_____

9. This chapter discussed a number of ways instructors might organize their lectures. In what format was the description of the four instructor "styles" presented in the reading? _____

10. What are the four main types of lecture organization?

_____

_____

_____

11. Evaluate the list of things included in a syllabus. List the four that are most important to you and discuss why you chose these items.

_____

_____

_____

_____

_____

_____

12. Does your course syllabus provide information on how to get extra help? If so, describe how you can get extra help.

_____

_____

_____

_____

_____

_____

13. Does your school have a media center? If so, where is it, and during what hours is it open?

_____

_____

_____

14. In the following groups of words, one word does not belong in each group. Circle the word that does not belong, and explain why you think it does not belong to the group.

a. Data, syllabus, hypothesis, analysis

_____

b. Experiment, skipper, follower, synthesizer

_____

c. Table of contents, procedure, glossary, index

_____

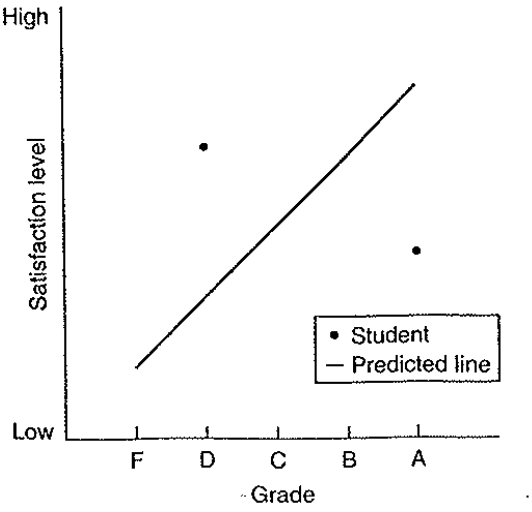
15. Explain how your final grade will be determined.

_____

_____

_____

16. Place a data point for yourself on the graph that follows.



Graph of student grade vs. satisfaction in a science course.

Note that if you answered question 16, you had to

- Read the labels on each axis.
- Choose a level of satisfaction
- Choose a grade level.
- Locate the level of satisfaction on the vertical scale and locate the grade you desire on the horizontal scale, then draw an imaginary line from the satisfaction axis and up from the grade axis. Where these lines meet is where you placed yourself on the graph.

Generally, the degree of self-satisfaction a person feels is directly proportional to the grade he or she earns. The higher the grade, the greater your feeling of self-satisfaction. However, exceptions do exist. The data points represent real student data, and the line is a prediction of the relationship between a student's grade and the resulting satisfaction level.

17. What actions will you take to ensure that you are satisfied with your grade in your science course? Be specific.

_____

_____

_____

_____

_____

18. What kind of graph appears in figure 2.1? _____Draw the same type of graph to show how much each quarter and the final exam at the end of the year occupies in your overall course grade. Use the space below to draw your graph. Be sure to properly label your graph (use figure 2.1 as an example). Make good use of all of the space provided below (your chart should be large).