"How To" Pass Science Classes

(Material adopted from Handbook on Teaching Undergraduate Science Courses
By Gordon E. Uno, University of Oklahoma, 1997)

The LACC Science requirement may be the most difficult 12-15 credits you take at WOU. Why?

- A lack of solid science and math background from high school
- A negative or indifferent attitude toward science
- A lack of critical thinking skills
- A lack of self-discipline and study skills

What can you do about each of these?

- A lack of solid science and math background from high school
  Nothing, your background is behind you and you should not waste time and energy dwelling on what may have been.

- A negative or indifferent attitude toward science
  Change your attitude.
  - Don't blame your professor. Professors at WOU work here because they are interested in teaching. They like to teach and they like students to learn. Most everyone does everything they possibly can (office hours, study groups, etc.) to facilitate student learning at the **university level.**
  - Don't cop out with this statement, "I just don't get science." The LACC science requirement is in place to round out your liberal arts education and to make you a better teacher, law enforcement officer, or whatever your career goals are. Become interested in science and think about ways it may impact your life (agricultural, politics, medicine, environment, etc.)

- A lack of critical thinking skills
  In high school, students could do reasonably well by memorizing and recalling facts. This is not adequate for college courses. In college science courses, you must **think and reason** about the concepts of the course. How can you be better prepared to do this? See the next section.

- A lack of self-discipline and study skills
  Somewhere in your preparation for college life, someone told you to expect to spend 2 hours of studying a week for each credit hour of class per week. The LACC science courses are 5 credit hours each. **Do you spend 10 hours a week studying science?** You need to. On the next pages are some tips for improving your study habits, note taking skills, and preparation for exams.

"How To" Study for Science Classes

I. Studying Is More than Spending Time!
   A. Make a commitment to understand (not memorize)
      1. Knowing details at the expense of the "big picture" is **not** the goal
      2. First build a foundation of understanding
      3. Then add details to complete the picture
   B. No amount of memorization can help you understand such things as:
      1. Concepts (the ideas that connect the details)
      2. New situations (applying what you have learned to new cases)
   C. Always ask yourself QUESTIONS (especially Why and How)
      1. How does this concept apply to other material?
      2. Why does this phenomenon work this way?
      3. Make connections with previous material

II. What Can You Do to Improve Study Habits?
   A. Be responsible for your own success
      1. Attend class on a daily basis

2. Pay attention during lecture
3. If you don't understand something, ASK QUESTIONS!
4. Be sure to spend **at least 2-3 different sessions per week** studying science.

B. Prepare for class ahead of time
   1. Skim that day's assignment before class
      a. Become familiar with figures, diagrams, and terminology
      b. Ready your brain for that day's topic

C. Taking notes
   1. Your notes need only make sense to you, but they must make complete sense!
      a. Can you explain every figure and word in your notes?
      b. How does the information on one part of a page relate to other parts?
   2. Develop a short-hand for common words, terms, definitions
      a. Examples: b/c=because, w/n=within, $\rightarrow$=leads to
   3. Do not attempt to write down every word the lecturer says—**LISTEN FIRST, THEN WRITE!** If necessary, use a tape recorder—but if you listen to the lecture again, make certain that you paraphrase what is being said. **Put the notes into your own words.** This is the most important aspect of notetaking. Can you explain your notes to someone else?
   4. Use an outline format (forces you to organize material)
   5. Leave lots of room for later additions, ease of finding items, adding examples, etc.
   6. Annotate your notes with things that remind you to:
      a. Ask a question
      b. Clarify a point
      c. Refer to a diagram in the textbook
   7. Don't attempt to copy complex diagrams during lecture
      a. Make a note in the margin to look up a figure in the textbook or to copy the figure later
      b. Listen to what is said about the figure (make simple notes)
   8. Make sure you include drawing and examples. Both will help you remember the main point of the lecture.

D. After class (no later than the next day)
   1. Review your notes, filling blank spaces with information from class. Recopying your notes is a waste of time unless you actively work with them, adding examples and writing the notes in your own words. Spend time organizing your notes so they are easy to review and follow.
   2. Add necessary figures from textbook
   3. Carefully read text assignments and add information to your notes
      a. Highlighting is OK, but it can lead to a false sense of security
      b. Stop reading periodically, close the book and ask yourself questions such as:
         i. HOW and WHY does it work?
         ii. HOW does that relate to last lecture's material?
   4. Mark all parts of the notes that you don't understand and get those questions answered immediately.
   5. Link different sections of the notes to each other and make transitions between sections.

E. Make use of objectives provided on the lecture handouts

F. Use extracurricular help (office hours, Learning Center, study groups)
   **Remember: 3-4 hours of serious study per week, for 4 weeks, is much more effective than 12-16 hours memorizing right before the exam!

III. How to Prepare for and Take a Science Examination

A. Take the exam seriously (your professors do!)

B. Plan ahead: begin preparing 3-4 days in advance of the exam
   1. This makes smaller bouts of more-intense work possible
   2. Provides time to have questions answered

C. Take advantage of previous exams and practice exams (if available)
   1. Treat them like real exams (test your understanding)
   2. Make sure you know why the correct answers are correct

D. Study with friends (but do it seriously)
   1. Ask each other the hardest questions you can think of
   2. Come up with your own exam questions
   3. Try to make connections among topics (look for the big picture)
   4. Try to draw pathways, relationships, etc. on paper or chalkboard
   5. Explain the major concepts in your own words

E. Exam taking strategies
   1. Get a good night's rest—RELAX! (Easy if you have prepared)
   2. Read the questions CAREFULLY
      a. What is being asked
      b. What do I know about the topic (write in the margin)
   3. READ ALL THE ANSWERS
      a. Systematically eliminate incorrect responses
      b. Use logic to choose between remaining answers

IV. Some Methods for Effective Use of the Text

A. Skim the chapter
   1. Be able to explain in simple English what the chapter is about
   2. Get a general overview of the chapter. Don't get bogged down in facts.

B. Get a handle on the vocabulary. Make yourself flash cards—read it, write it, say it.

C. Look for statements you do not understand. Mark anything you don't understand and get your questions answered! (professors, tutors, classmates)

D. Consolidate your knowledge. Write a 2-3 page summary of the chapter from memory. Compare your summary to the chapter summary in the text.

E. Use the book to answer questions with someone else to determine what you understand and what you need to work on.

F. Be extremely selective in what you mark in the text.

The P.E.E.L. Method

If you want to try to focus on what's important in your reading and to organize your lecture and lab notes and handouts, you might consider using the following method with each scientific concept you are trying to understand. This ideal is called the PEEL method. It's an acronym based on four simple steps that you should take when thinking about a concept, to help you "peel away" the layers of materials to get to the core information. In this method of analyzing a concept you should ask:

P: What's the **Point**? What is the main idea and importance of the concept or topic?

E: What's the **Explanation** of the concept—how does it work or what is its function?
E: What's the **Example** of the concept?

L: What's the **Link** between this concept and others? How does this concept relate to others you have read or heard about in your reading or lecture?