



Science Learning Strategies Module

Produced by the Department of Retention, Recruitment and Tutoring, with assistance from CAPE and the Biological Sciences Department

One of the most common questions that students ask science instructors is “How can I do well in your class?” The following is a series of science learning strategies that will help you succeed in your science class. It provides strategies for time management, as well as tips for studying effectively and test taking strategies.

COURSE SYLLABUS

- It tells the student how to successfully pass the class.
- It must be carefully read and you must highlight due dates for tests, quizzes, papers, etc.
- Transfer all assignment dates onto a monthly calendar and daily planner
- If course has an online component, log on to Web CT on the first day of class

TIME MANAGEMENT

1. Developing a Weekly Schedule (see companion files on the tutorial web site)
 2. Scheduling all fixed activities (classes, work, etc.)
 3. Scheduling time for meals, sleeping, traveling, grooming
 4. Scheduling study time for hardest class at periods of peak efficiency
 5. Scheduling time between classes to review notes from preceding classes, and time to read materials for future lectures.
- On a At-A-Glance Monthly Calendar writing all major assignments (tests, quizzes, papers, etc.), and using different color markers to indicate type of assignment (i.e., all tests in red, quizzes in blue, homework in green, etc.)
 - Prioritizing and making To-Do Lists on a daily basis.

READING SCIENCE TEXTBOOKS

In science courses, your textbook is your most valuable tool. Lectures will provide a synopsis of the text, but it is crucial to know the assigned reading from your textbook.

- Timely reading is critical. Read assigned materials before and after the class period in which the material is discussed (check your course syllabus for dates).
- **Use the SQ3R Reading Method**
 1. **SURVEY** or scan the assignment quickly, taking no more than five minutes to glance over the entire chapter.

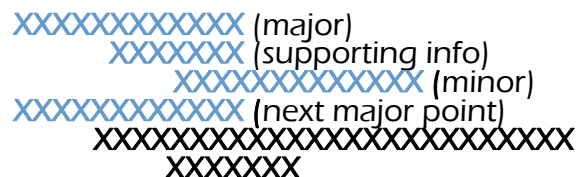
- a. Start by **reading the summary** and **review questions** at the end of the section/chapter.
 - b. Read the heading and sub-heading (titles & sub-titles).
 - c. Inspect/study all graphs, charts, maps, tables, diagrams, and pictures (represent a visual summary of critical facts).
 - d. Read the **caption** under any illustrations.
 - e. Pay attention to the words and vocabulary in bold or in italics.
2. **QUESTION** “What are the main points?”
3. **READ slowly** and with the goal of understanding what is being discussed.
- a. Read actively, underlining or highlighting key words and phrases.
 - b. Take notes on the margins or on a separate notebook; writing the information in your own words.
 - c. **Study diagrams and pictures** and take note of labeled parts. Re-draw and re-label to test yourself.
 - d. Write down on **flash/index cards** vocabulary words, symbols, formulas, and processes. (They are often discussed in class!!)
 - e. When studying definitions on flash cards, don’t just memorize the words. **You must know the vocabulary well enough to be able to explain to another person.** For example, explain terms out loud to your study buddy, or close your eyes and imagine you are teaching the concept to somebody else. Memorizing without understanding could end up confusing you if in the test a term is presented in a slightly different manner or context.
 - f. Answer questions at the beginning or end of chapters or study guides.
 - g. Start a vocabulary page or note card system with definitions on underlined, italicized, and bold printed words or phrases.
 - h. Stop and reread parts which are not clear.
4. **RECITE** after each section.
- a. After you read a detailed paragraph or study a diagram, stop and take your eyes off the text. **Try to recall** what you have just read/studied. If you cannot recall all or most of it, **go back and read it again** until you are able to recall most of the information
 - b. Summarize key information in your own words.
 - c. Reread and repeat marginal notes and underlining.
5. **REVIEW** as an ongoing process.
- a. Review materials shortly after it has been learned.
 - b. **Answer all questions at the end of the section/chapter without looking at the answers.** If there are things that you are still uncomfortable with, reread that section of the chapter.

- c. Alternate between flash cards and notes to test self (orally or in writing).
 - d. Periodically review to avoid cramming before a test.
 - e. When reviewing, divide the material into small sections rather than sitting down with an entire chapters worth of notes.
- **If when reading the textbook you don't understand a word** – do not skip it. Rather stop and find the meaning before proceeding; keep the companion book glossary or dictionary at hand. This is especially critical for students who speak English as a second language. If you speak Spanish we strongly recommend you buy the Companion Biology Glossary in Spanish from the CSN bookstore. If you speak a different language try acquiring the companion glossary in your native language from the Internet.

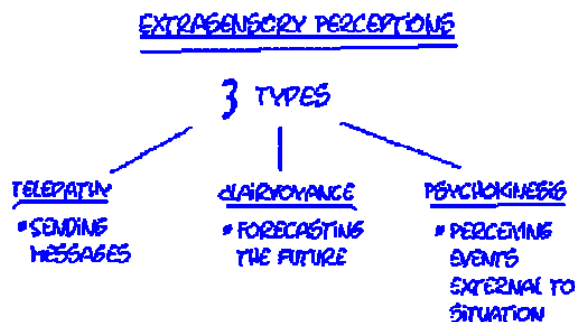
MAKING THE MOST OF LECTURE TIME

- Always read assignments before class.
- Practice **LISTENING** and **LOOKING** at instructor. Be attentive, and sit near the front and center of the class.
- Focus on what's being said, NOT on mannerisms.
- If you have questions during lecture ASK THEM. If you wait until later, you will more than likely forget what your question was.
- **Bring colored pencils and markers to make drawings** with during class. These diagrams will stand out in your notes and make studying more interesting!
- **Highlight** things in the book the instructor took time to draw out on the board or go through step by step.
- Recommend Methods for Taking Notes:

The Outlining Method_- Listen and then write points in an organized pattern based on space indention; place major points closest to the left of the page. Below each major point, indent the more specific group of facts or supporting aspects further to the right.



The Mapping Method_- Map or make a graphic representation of the content of the lecture.



What to Include in Class Notes:

- **Take as many notes** as you can during a lecture or seminar. Use your textbook to add to sections that are elaborated upon. Draw pictures and write out definitions, if not during class, afterwards.
- Write the instructor's own words (paraphrasing) as much as possible, but using symbols, contractions, and abbreviations to condense information.
- Include details, illustrations, implications, etc.
- To denote importance, use underscoring, highlighting or asterisks (*).
- Leave plenty of white space for later additions.

After class:

- As soon as possible, after each class period, **review** and **reword** incomplete notes in greater detail. Should be done within 24 hours from attending the lecture.
- If time permits, **rewrite your notes**.
- Fill in gaps as points that were not recorded are remembered.
- Find answers to any questions by looking in the textbook and by asking the instructor or a classmate. **This is the time to incorporate textbook information and notes written on the book's margin into your lecture notes, thus combining both class and book concepts in ONE comprehensive document.**
- Compare notes with other students or with a study group.
- **Read through your lecture and seminar notes at least once a day!** Make it a post-class time or evening time ritual!
- **Make questions & answer cards** on difficult material or definitions. Take these **index cards** with you everywhere and study them when you are waiting with nothing to do, like standing in line or stuck in traffic.
- **Know your notes backwards and forwards!!**

Regularly review notes and DO NOT cram before the test.

IMPROVING MEMORY SKILLS

- Starts with proper **CONCENTRATION**:
 1. Because hunger, tension, and tiredness diminish concentration, **physical needs must be taken care of first.**
 2. **Setting goals** for each study session provides a point of conclusion and a sense of accomplishment (positive feeling).
 3. **Maintaining a regular place for studying, free of distractions.** TV, people, the fridge, cell phones, etc., are distracting. Keeping all necessary materials (books, notes, etc.) close by to eliminate having to get up.

- Strategies For Improving Memory:
 1. **Minimize Interference**— Space out studying for courses with similar subject matter content. (i.e., BIO 223 and HIT 117)
 2. **Distribute Learning** - Study in short (1 hour) sessions, followed by a 5 minute break, then move on to another topic, and then repeating the same schedule.
 3. **Over Learning Material** - Use as many **active learning techniques** as possible (i.e. note taking, restating, study groups, outlining, flash cards, etc.)
 4. **Review Immediately**— Reinforce memory through immediate recall. **Successful reviewing requires active discussion, recitation, and writing in your own words.**
 5. **Practice Restating**—Re-stating or re-writing the material being learned in your own words makes later recollection much easier.
 6. **Recognize Negative Attitudes** - They are an obstacle to initial learning and recollection.
 7. **Organize Material in an Effective Way** - Grouping facts and ideas meaningfully is called **CHUNKING** and it can aid in remembering better.
 8. **Create and Use Images**- Visual images (i.e., pictures, diagrams, flow charts, and mind maps) can be helpful in learning and remembering.
 9. **Use memory cues (“MNEMONICS”)** - When reading a textbook, trying to find a key word or phrase which symbolizes the main point in each paragraph. Some mnemonic devices are:
 - **Acronyms or “new words”**: Using the first letter from a series of words or phrases to form a new word. For example, “HOMES” for recalling the Great Lakes: Huron, Ontario, Michigan, Erie, and Superior.
 - **“Creative sentences”**: Making a phrase so that the first letter of each word represents something about the information that is being learned. For example, “Every Good Boy Does Fine” for the E, G, B, D, F, lines of the treble music staff.
 - **Rhymes and songs**: Making up short, catchy sayings that include the essential information.

GENERAL STUDY TIPS

- **Find a study partner!** Things are more likely to be remembered when you have to explain something out loud to another person.
- Seek **out your instructor outside of class** when you need additional help, and come prepared to ask specific questions. Ideally, have your questions written out ahead of time. This will make the time with your instructor more productive.
- **Try to make up catchy phrases** to remember difficult things in class.
- **Try to think of possible test questions.** Quiz yourself and try to answer the questions without looking at your notes.

- **Seek tutoring** if you have difficulty reading the material, understanding the lectures, or taking the exams.
- **Make the most of lab time.** Know in advance what procedure you will be doing and come prepared. Also, use this time to increase your knowledge by interacting with other students.
- **DO NOT WAIT UNTIL THE NIGHT BEFORE TO STUDY FOR AN EXAM!!**
Also, do not study while listening to music (unless it has no lyrics) or while watching TV. Find a nice, quiet place to study. Don't forget to turn off the cell phone and computer!!!

TEST TAKING SKILLS

- **When an exam is announced, you should:**

1. Know what materials (chapters, class notes, handouts, etc.) will be covered on the test.
2. Know what kind of test it will be: Essay, Objective (true/false, multiple choice, fill in the blank, matching type), or Problem-Solving.
3. Find out as much as possible about scoring, nature and format of the questions.
4. Prepare study questions based on sample tests, previous quizzes, lecture notes, handouts, etc. (Find out if there are old tests or quizzes from the instructor or former classmate).
5. Always attend class, especially the class before the test.
6. Ask questions as they come up - getting help from the teacher, classmates, and tutors.
7. Make every attempt to form a study group.
8. **Plan for study time:** Schedule regular, short, focused reviews with short breaks in between. *Better method than last night cram sessions!*
9. **Design study approach according to the type of test:**
 - a. For an **objective test**, concentrate on memorizing factual details such as names, formulas, facts and definitions.
 - b. For **essay and multiple choice questions** concentrate on understanding general concepts, principles and processes.
 - c. For a **problem solving test**, work examples of each type of problem that may appear on the test.
 - I. **Use time drills** – Practice working fast, timing self and study buddies.
 - II. **Understand what each formula represents and review daily.**
10. Make a final comprehensive review on the night before the test.
11. Go to bed early, to be mentally and physically alert. Force worry out and be positive!
12. **Do not arrive to the test with an empty stomach.** EAT at least 2 hours before the test. The brain needs carbohydrates to work!!!!

- **What to do during the test:**

1. Arrive early to have time to relax and be prepared

2. If taking a Scantron test: use a #2 pencil; purchase answer sheets well ahead of time; try to answer each question; double check answer lines with straight edge (ruler, another paper); and erase completely and thoroughly when changing answers.
3. Before answering any part of the test, **fully understand** all test directions by reading them first.
4. If you forget something, do not to panic, but mark it, go on and return to it later. If you are using a scantron sheet, you may want to use a highlighter to mark the number on the scantron corresponding to the question you have “abandoned” to return later. The scantron will not pick up the highlighter and you will be sure to go back and answer all the questions. By guessing an answer you have at least a chance of getting it right, as opposed to leaving it blank – where you stand a 0% chance of earning points.
5. If you get stuck on a question, try drawing a detailed picture to help you work through the answer.
6. Do not feel uncomfortable if other students finish before you.
7. Do not try to be the first one to leave, but use any time left to check over answers.
8. Check your work **as you go. Make sure you followed the directions and used the correct formulas.**

- **Taking Problem-Solving Test:**

1. Know the formulas and review them just before the test. Once the exam is in your hands write down any formulas, equations, and rules that are difficult to remember. **This will allow you to refer to them during the exam.**
2. Analyze before computing. Set up the problem before beginning to solve.
3. Draw a picture or diagram if stuck.
4. If unable to work a problem, go on to the next one and come back to work on it if time allows.
5. Show all the steps in answering the problem and clearly identify the final result, making it easy to identify.

- **Taking Objective Tests:**

1. Answer all questions without skipping or jumping around. Do not waste too much time on any particular question. Mark it and return later as time permits.
2. Guess if necessary. Don't leave blanks.
3. If you have to guess, choose the longest answer.
4. If among several answers two are similar, except for one or two words, choose one of those two answers.
5. Questions with absolute qualifiers, such as “always” or “never” usually indicate a false statement.
6. Be aware of multiple ideas or concepts within the same true-false statement. All parts of the statement must be true or the entire statement

- is false.
7. If the question states “All the above” or “None of the above” then the answer is rarely correct.
 8. If the answer calls for a sentence completion (fill in the blank or multiple-choice) eliminate the options that would not form grammatically correct answers.

- **Practice P.I.R.A.T.E.S. Test-Taking Strategy**

This strategy, based on good and sound teaching practices, was researched and developed by *The University of Kansas Center for Research on Learning* provides a sample strategy to improve student performance on classroom tests.

Its design includes a six-fold purpose:

1. Allocate time and order to each section of the test.
2. Read and focus on the instructions.
3. Answer or abandon each test question.
4. Make informed choices (guesses) on the questions they don't know.
5. Feel in control of the test, using self-talk and “test-wiseness”.
6. Utilize any and all of their study strategies as you take the test.

Step 1: Prepare to succeed: Begin taking the test using the steps PASS:

- P:** Put your name and PIRATES on the test,
- A:** Allot time and order to the sections of the test,
- S:** Say your affirmations and
- S:** Start within two minutes

Step 2: Inspect the instructions: Use the steps RUN:

- R:** Read the instructions,
- U:** Underline what to do and where to do it,
- N:** Note any special requirements.

Step 3: Read, Remember, Reduce: Begin to answer the questions using the techniques of

- READ the whole question,
- REMEMBER what you've studied, and
- REDUCE your choices, marking out the choices that you know aren't applicable.

Step 4: Answer or Abandon: You have a choice to either answer the question or abandon it to make the best use of time. If you abandon it you must place a mark next to it to indicate you'll come back to it. Recycle through this step answering everything you know on the test and then turn back to the ones you are unsure of.

Step 5: Turn Back: When you get to the end of the test, turn back to those abandoned questions by **using the ACE guessing techniques described below.**

Step 6: Estimate: Using the ACE guessing techniques:

Avoiding absolute words,

Choosing the longest and most detailed answer and

Eliminating similar choices.

Step 7: Survey: After you have completed all the steps you must look over the test one more time to survey **if you have answered all the abandoned questions and only change an answer if you are positively sure it is right.** Usually their first choice is the correct one

**LEARN THE MEANING OF THE FOLLOWING PREFIXES AND SUFFIXES
COMMONLY USED IN ANATOMY AND BIOLOGY**

When the hyphen "-" shows after, it denotes a prefix placed in front of the word, the hyphen "-" before denotes a suffix or word ending

ANSWER	MEANING
A-	without, not
Adipo-	fat
Arthro-	joint
-Ase	enzyme
Blasto-	germ or bud
Bronchi-	refers to the bronchi or various air passage-way (ducts) associated with the lungs
Bucca-	pertaining to the mouth or cheek
chondro-	cartilage
chromo-	color or pigment
ecto-	outer, external
endo-	internal or within
epi-	on, upon, at outer, or covering
exo-	outside, outer, or external
heme-	a red, iron-containing pigment found in red blood cells
hepato-	liver
hetero-	differnt, other
histo-	tissue
homo-	same or like
hydro-	water
infra-	below
inter-	between
intra-	inside, within
iso-	same, equal
lipo-	fat, or lipid
macro-	large
mamma-	breast
meso-	middle

micro-	small
mono-	single or one
morph-	form or structure
multi-	many
myo-	muscle
nephro-	kidney
osteo-	bone
para-	near, alongside
peri-	around
phag-	eat
pneumo-	air, breathing
poly-	many
retro-	behind
sub-	under, below
supra-	above or beyond
syn-	together
-blast	indicates an immature stage in cellular development
-cyte	cell
-clast	breaking into parts or smaller divisions
-itis	inflammation
-ology	study of
-osis	a state or condition, usually indicates an increase in the condition
neuro	nerve

EARLY ASSISTANCE AND OTHER RESOURCES

- **Seek assistance from the instructor.** If you are failing, doing poorly, or simply want to improve your grade – Do NOT delay seeing the instructor. If you don't, your teacher will simply assume that YOU do not care about your success in the class. Why should he/she then care if you don't? Therefore, take advantage of this extraordinary resource . . . there is probably no better tutor than your teacher.

But before you go the instructor's office hours, prep to make the best use of time:

1. **Organize your ideas before meeting with the faculty member – Arrive prepared** with the list of questions, requests, or concerns. An

organized list will ensure that you don't forget any of the points. You will also be less anxious if you are fully prepared.

2. Questions should be listed on paper beforehand.
3. Have paper and pen available. It is best to record all information provided from the faculty member rather than rely later on memory.
4. Bring the text, class notes and syllabus to the office.

- **Math & Science Labs** – FREE individual and group drop-in tutoring offering assistance in various levels of math and science.

CHARLESTON	Bldg. H – Room 203	651-5732
CHEYENNE	Room 2050	651-4232
HENDERSON	Bldg. B – Room 201	651-3125

- **Tutorial Services** – Provide four hours of FREE one-on-one tutoring per credit hour in a variety of courses.

CHARLESTON	Bldg. D – Lobby	651-5732
CHEYENNE	Room 2100 (Library)	651-4232
HENDERSON	Bldg. C – Computer Lab	651-3125

- **Accessing Smarthinking**

Offers online tutoring, writing services, and homework assistance 24 hours a day, 7 days a week. It provides assistance in **Mathematics (Basic Skills through Calculus II), Writing, Chemistry, Physics, Biology, Accounting, Economics, Spanish and Statistics.** To access the service go to www.smarthinking.com.

For Log-in and password information please visit <http://www.csn.edu/pages/1259.asp> or call 651-5619.

- **Retention/Student Success Services Information**

Trained specialists/advocates help students assess personal strengths and limitations, develop college success strategies, implement action plans, learn to navigate the educational system, benefit from campus and community resources, and connect to campus life.

CHARLESTON	Bldg. D-151	651-7367
CHEYENNE	1111 Student Services Area	651-2626
HENDERSON	Bldg. B – 130	651-3103

- **Web links**

Helpful Web links

<http://msjensen.cehd.umn.edu/webanatomy/default.htm>

<http://faculty.clinton.edu/faculty/Michael.Gregory/Default.htm>.

<http://www.bio.psu.edu/people/faculty/strauss/anatomy/skel/skeletal.htm>.

<http://www.getbodysmart.com/ap/histology/menu/animation.html>

Use the Library

In addition visit the library web site <http://www.csn.edu/pages/1535.asp>,

for additional help in researching topics or areas that you are interested in or need additional information about. Triangulate your textbook and class lectures with web sites from universities and other institutions of higher learning; available to you via the web.