Study Skills Workshop for Science Majors

Lisa Solmose
lsolmosenjdoe@gmail.com
To Discuss

• How People Learn Science
• General Study Tips
• Reading Texts
• Taking Notes
• Test Preparation Strategies
• Test Taking Strategies
• General Academic Planning
9-12

Plants alter the earth's atmosphere by removing carbon dioxide from it, using the carbon to make sugars and releasing oxygen.

6-8

Plants use the energy in light to make sugars out of carbon dioxide and water.

Food provides molecules that serve as fuel and building material for all organisms.

Carbon and hydrogen are essential elements of living matter.

4-5

Almost all kinds of animals' food can be traced back to plants.

From food, people obtain fuel and materials for body repair and growth.

Air is a substance that surrounds us, takes up space.

2-3

Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light.

PK/K-1

Most living things need water, food, and air.
www.bozemanscience.com
How To Study Science: General Tips
How to Study: Routine

• Find a place to study that is free of interruptions and distractions
• Establish your own behavior patterns of what, when, where and how much to study
How To Study: Time

• Study in 1 hour blocks
• Total study time differs among students and courses
• You benefit primarily during the first hour
• After an hour, take a break. You can spend 10 minutes texting or online, just don’t study
• Your brain can only handle 50-60 minutes of work at a clip...Take a break, go back and focus
How To Study: Repetition

• One way to learn is through repetition
• After you initially memorize information and do nothing to reinforce it, within 24 hours you will retain only about 35% of the memorized information
• Only about 10% remains after an additional 24 hours
How To Study: Techniques

- Study with a partner/group; get a tutor
- Draw it; symbolize it; write it out; speak the words out loud
- Explain in sequence a list of events
- Make flash cards for terms or symbols
- Relate the information to what you already know or to experiences you have had
- Teach someone else, and have them quiz you
How To Study: Groups

• Find fellow members of your class to study with, not necessarily your friends
• Everyone has different strengths and weaknesses
  – Consider a jigsaw method of study, where each person masters one concept and then explains it to the group
• If you can correctly explain a concept to someone, then you understand it well
• Study groups work best with 4-6 people
How To Study: Problems

• When studying, look at potential exam problems and mentally solve the problems
• Don’t pick up a pen until you know exactly what you are going to do
• Know the steps you will do in what order, what information you need and what equations
• When doing chapter problems (as well as exam problems), methods are critical and should be second nature
More Specific Tips
Reading Texts

• It's very important that you read the text before class; but HOW you read the book makes all the difference.
  – If you don't have time to read the whole chapter, at least look at all of the pictures and read the captions
  – Don't try to memorize the whole chapter. The instructor will let you know which concepts are most relevant
Reading Texts

• It's very important that you read the text before class; but HOW you read the book makes all the difference.
  – Graphs are absolutely critical in science
Importance of Graphs
Graphing Activity

Work in pairs or triads to match the data categories (and associated questions) to the appropriate graphical representations.
Does your question ask about the variability of the data?
Does your question compare two or more groups to decide if the groups are same or different?
Does the question attempt to correlate two different variables, without considering time?
Does the question attempt to correlate a variable against time?
Reading Texts

• Vocabulary of science is like a foreign language

• Make a list of all the words in the chapter that you don't understand
  – Terms may be explained in class, and having these words written down is a head start
  – More likely to understand the lecture with an idea of key terms (even if you don't know what they mean)
Reading Texts

• Note any pictures, graphs or images used multiple times in the same chapter
  – Photocopy/reproduce the picture and bring it with you to class
  – Find a similar picture online and print it
  – Labeling a picture may be easier than trying to draw it in your notes

• Note all essential components of the image
Reading Texts

• If the instructor has online notes, review sheets or other information, read them prior to class

• Bring them with you
During Lecture

• Come prepared
• Bring your book and any note sets/review sheets that the instructor provides
• Take notes in the book or on the note sets rather than in class
During Lecture

• It is difficult to keep up with the speed of lectures

• Take pictures from the book (or photocopies) to help take notes much more quickly
  – Write something like "see fig 3.5" in your notes to reference the book
During Lecture

• Don't try to write down everything the instructor says. Some hints for taking notes:
  – If the instructor writes it on the board – put it in your notes
  – If the instructor says "this is important" or something similar – put it in your notes
  – If the instructor refers to something in the book – write down the page or figure number so you can go back to it later
During Lecture

• Don't try to write down everything the instructor says. Some hints for taking notes:
  – Develop a system for taking notes. There are official methods for taking notes – or you can develop your own. If there are sets of words that are used a lot in class – make up a symbol for them that you will remember. (You may want to make a list of these symbols in case you forget.)
  • You can try working on your note-taking system by watching a TV show or movie and taking notes
During Lecture

• If you miss something during lecture:
  – Ask the instructor to repeat the information
  – Leave a space and move on – come back and fill in what you missed later
  – Don't miss the next point because you were asking your neighbor about the last point
During Lecture

• You may want to record the lectures. This way, if you miss something, you can always go back to it
• You can also listen to the whole lecture again
• The key to this strategy is repetition – it may not stick the first time, but it will stick eventually
In Lab

• Read the lab for that day and make sure you fully understand what you are doing in class
• Most lab classes expect self-sufficiency; you need to understand what is expected of you
• Be organized and have a plan
• Don’t spend your lab time figuring out what you are supposed to do, you may not finish the lab
In Lab

• Divide and conquer with lab partners; you may not have time to do all parts of the experiment on your own
• Lab class highlights the collaborative nature of scientific work
• However, make sure you understand all parts of the experiment, even if you didn't actually conduct it yourself
After Class

• Rewrite your notes. This is time-consuming, but does two things:
  – It gives you a chance to review what you covered in class and make sure you didn't miss anything
  – It also gives you a well-organized set of notes to study for the test

• This strategy works best if the notes are redone shortly after class
After Class

• Use the resources that are provided:
  – There may be models, practice tests, or computer resources that are available to you
  – There are also tutors that can help answer questions
  – If you have any questions, ask your instructor during office hours
    • Instructors do not mind answering direct and specific questions related to the content of the course
Strategies for memory-based tests

• Flashcards

• Write VERY LITTLE on the card

• Some tips for how to make good flashcards:
  • One side of the card should have one vocabulary word on it and the other side should have a definition or picture
  • Alternatively, you could write one question on the front side, and the answer on the back
Strategies for memory-based tests

• Some tips for using flashcards:
  – Study the flashcards in both directions (looking at the word and saying the definition, and looking at the definition and saying the word)
  – Keep them with you, study them as you wait in line, etc.
  – A little studying more often is better than a lot of studying for a short time
  – Make piles with your flashcards: information you know and information you forgot
    • Go through the pile you forgot again, repeat process
    • Spend more time with cards that you struggle with
Strategies for memory-based tests

• Photocopy pictures from the book (and remove the labels)
• Make about five copies of each picture. Hang these pictures all over your house
• As you walk by each picture, label one thing on the picture.
• Next time you walk by it, label something else.
• Study what you don’t know
Strategies for memory-based tests

• Coloring books or textbook images
• Key is to color a little at a time, and repeat frequently
  – You can photocopy or trace the pictures from the textbook, then color and label them.
  – Make a few copies of these pictures and remove the labels
Strategies for memory-based tests

• Use open lab time, if available. Touch and study any 3-dimensional models/specimens:
  – Identify list of terms on the object
  – Point to and name all the parts of the object that you need to know (without the list)
  – Then, check the list
Study strategies for concept-based tests: Processes

• Draw, trace, or photocopy a picture of the process from your book (remove the label)
• Label the parts of the picture without using the terms
• Put the steps of the process in order and draw a graphic/conceptual model
• Color-code the different steps of the process
• Draw the picture from scratch, without any words in front of you
Study strategies for concept-based tests

• Write a paragraph explaining the process.
  – You can also take all the parts of the process and put them on note cards. Now, use the note cards to explain the process.
  – Use play-doh to build a model of the process.
  – Explain what you learned in class to your roommate or family member. Ask them if they understand what you have explained.
During an Exam

- Eat about 45 minutes before the exam
- Be on time and come prepared
- Go with your first instinct when answering
- If you have difficulty with a question, make a mark in the margin to return to that one later
  - Avoid losing time for the questions that come easily to you
- For a chemistry or physics exam, skim the entire exam over quickly before you answer any question
  - Find the problems that you can answer, complete them 1st
  - Boosts your confidence for more challenging problems.
  - The easiest question may not be question #1
Other Factors Affecting Learning

• Exercise
  – increases your ability to focus
  – reduces stress, which helps your immune system

• Sleep
  – at least 6-8 hours
  – brain files information away during REM
  – Establish a regular pattern of sleep each night

• Use Planners
  – Prioritize: 1 = things that must get done, 2 = what you should get done and 3 = what can be done at other times
  – Plan regular study time in advance
Thank You.