Biology Study Guide

How to Study Biology

Tips for Surviving Biology 105
Biology Study Guide
How to Study Biology

Lectures

1. Go to all lectures. If you miss any, get notes from a friend or find the PowerPoint's online.

2. Be an active listener.

3. It is important to be alert and concentrate on what is said in lecture.

4. Take full and comprehensive notes.

5. Ask the instructor questions before, after, or during class.

6. Do not allow yourself to miss classes and fall behind or the entire course will become an effort and a struggle for you.

7. Review lecture material that night to solidify the concepts in your brain.

Reading

1. Do all pre-reading for a lecture. Many students don’t. If you miss a reading, make sure to play catch up as soon as possible. DON’T save all your reading for the day before a test.

2. Reading is often your best bet to get confusing concepts in lecture clarified. Don’t hesitate to Wiki/Google things either: these are great sources for students.

3. Highlight/take notes/be an active reader. Tabbing the book with Post-Its® is also extremely helpful.

Study Sessions with Teaching Assistants

1. Find a GOOD Teaching Assistant! Napa Valley College provides TA’s in Biology 105. Use them!!! It can make all the difference.
2. You want a TA that explains concepts well, uses the blackboard/educational media well, challenges you with good test-like questions, and makes him-/she available for office hours.

3. Attend all study sessions. These may even be more helpful than lectures as they usually summarize all the week's material and then offer practice problems (similar to the test, which is what the bulk of your grade depends on!)

4. Attend office hours!

TAs can be the best help for completing a tricky Problem set (you'll learn so much more than from copying from a friend), or studying for a test (they often have seen the test already).

Problem Sets

1. Don't be intimidated about not being able to do a Problem Set. The questions are usually similar to but harder than test questions.

2. Don't start your P set late at night, start about two days before, so you'll have ample time to ask TA, peers for help).

3. Do all the P sets and don't hand them in late. This way you make sure you're on track with class material and you won't be super overwhelmed when the test rolls around.

4. Use the book/other resources to help you with P set questions.

5. To be frank, the internet holds a lot of answers, and if you can find a good explanation to a similar problem online you can learn a lot. (I'd use the internet as a last resort, though).
6. Remember, Problem Sets exist to help you learn and are pretty much worth nothing to your grade, so do the best you can and don’t stress about not knowing every answer.

Test Prep

1. Start studying at least 3-4 days before the exam.

2. Biology ALWAYS contains a lot of material!

3. Study biology when you are most alert and fresh. Make sure to take 5- or 10-minute breaks every 20 to 40 minutes in order to clear your mind.

4. Read and study all your textbook explanations of important concepts/biological techniques.

5. Whenever possible explain aloud to another person what you are learning. Work with a classmate and explain terminology and concepts to each other (this is super helpful!)

6. Write up summary sheets of biology terminology and concepts and review often.

7. Visualizing is a powerful technique for remembering terms.

8. Making up mnemonics (memory techniques) may be fun as well as beneficial.

9. Do at least one practice test before the real test to get an idea of what problems they can ask you. Time yourself.

10. Review the types of errors you make and types of questions that cause you difficulty. Give yourself more practice in these areas of difficulty.

11. If possible, have a friend or family member quiz you on your notes and text information. Done regularly this commits more information to long-term
Desperate Test Prep

So it’s 10 pm on the night before your morning test. What should you do?

Go through class notes quickly to get a grasp of things, read the book to clarify if needed. (1-2 hours)

1. Go over all Problem Sets: read the solutions/do over the harder problems. (1-2 hours)

2. Do as many practice tests as you can to get an idea of what you’ll be facing. (2 hours)

3. And if you’re allowed to bring a cheat sheet(s) for your test, compile it quickly, writing only the most necessary information. Now would be a good time to ask a friend about what they wrote on their cheat sheet. (1 hour)

How to Study for Biology Exams

Biology exams can seem intimidating and overwhelming to biology students. The key to overcoming these obstacles is preparation. By learning how to study for biology exams you can conquer your fears. Remember, the purpose of an exam is for you to demonstrate that you understand the concepts and information that have been taught. Below are some excellent tips to help you learn how to study for biology exams.

Time Required:
Varies

Here’s How:

1. Get Organized
An important key for success in biology is organization. Good time management skills will help you to become more organized and waste less time preparing to study. Items such as daily planners and semester calendars will help you to know what you need to do and when you need to have it done.

2. Start Studying Early
It is very important that you start preparing for biology exams well in advance. I know, I know, it is almost tradition for some to wait until the last minute, but students who implore this tactic don’t perform their best, don’t retain the information, and get worn out.

3. Review Lecture Notes
Be sure that you review your lecture notes before the exam. You should start reviewing your notes on a daily basis. This will ensure that you gradually learn the information over time and don’t have to cram.

4. Review the Biology Text
Your biology textbook is a wonderful source for finding illustrations and diagrams that will help you visualize the concepts you are learning. Be sure to reread and review the appropriate chapters and information in your textbook. You will want to make sure that you understand all key concepts and topics.

5. Get Answers to Your Questions
If you are having difficulty understanding a topic or have unanswered questions; discuss them with your teacher. You don’t want to go into an exam with gaps in your knowledge.

6. Quiz yourself
To help prepare yourself for the exam and find out how much you know, give yourself a quiz. You can do this by using prepared flash cards or taking a sample test.

7. Find a Study Buddy
Get together with a friend or classmate and have a study session. Take turns asking and answering questions. Write your answers down in complete sentences to help you organize and express your thoughts.

8. Attend a Review Session
If your teacher holds a review session, be sure to attend. This will help to identify specific topics that will be covered, as well as fill in any gaps in knowledge. Help sessions are also an ideal place to get answers to your questions.

9. Relax
Now that you have followed the previous steps, it’s time to rest and relax. You should be well prepared for your biology exam. It’s a good idea to make sure you get plenty of sleep the night before your exam. You have nothing to worry about because you are well prepared.

Biology Study Tips

Studying for biology can seem overwhelming, but it doesn’t have to be. If you follow a few simple steps, studying for biology will be less stressful and more enjoyable. I’ve compiled a list of several helpful biology study tips for biology students. Whether you’re in high school, or college, these tips are bound to produce results!

Biology Study Tips

Bio-Study Tip 1
Always read the lecture material before the classroom lecture. I know, I know—you don’t have time, but believe me, it makes an immense difference.

Bio-Study Tip 2
Biology, like most sciences, is hands-on. Most of us learn best when we are actively participating in a "topic." So make sure to pay attention in lab sessions and actually perform the experiments. Remember, you won't be graded on your lab partner's ability to perform an experiment, but your own.

**Bio-Study Tip 3**

Sit in the front of the class. Simple, yet effective. College students, pay close attention. You’ll need recommendations one day, so make sure your professor knows you by name and you aren’t 1 face in 400.

**Bio-Study Tip 4**

Compare biology notes with a friend. Since much of biology tends to be abstract, have a "note buddy." Each day after class compare notes with your buddy and fill in any gaps. Two heads are better than one!

**Bio-Study Tip 5**

Use the "lull" period between classes to immediately review the biology notes you have just taken.

**Bio-Study Tip 6**

Don’t cram! As a rule, you should start studying for biology exams a minimum of two weeks prior to the exam.

**Bio-Study Tip 7**

This tip is very important -- stay awake in class. I’ve observed too many people snoozing (even snoring!) in the middle of class. Osmosis may work for water absorption, but it won’t work when it comes time for biology exams.

**Bio-Study Tip 8**

Find some useful resources to help you when you study after class. Talk with the Librarians at the McCarthy Library for suggestions.
Successful Biology Student

INTRODUCTION
It is possible for all students to develop the skills necessary to be successful in college. Those who are not successful often do not lack the intellectual ability but lack well developed study skills. To help you develop and refine your study skills the following hints are presented. Remember, in college the final responsible for your success lies with you. The instructor will provide you with the necessary information but it is your job to learn and understand it.

STUDY SKILLS AND TEST TAKING STRATEGIES
In the following paragraphs you will find many different ideas and strategies for developing effective study skills. There are potentially as many different strategies used by successful students to study effectively as there are successful students. Each student must find what strategies work best for them. The information contained here is not intended to be an all-inclusive list of study strategies nor is it meant to serve as a recipe for the best way to study. Instead, use this page as a source of ideas for effective studying and try different techniques. Each person must find what combination works best for them. If you need further assistance there are resources that may be of help to you including your instructor, counsellors, and various study skills books (several are referenced at the end of this page). The following list of hints is divided into four sections:

I. State of Mind - you have to make a conscious effort to study effectively - it takes a lot of effort and motivation.

II. Time Management - there is no fast and easy way to study, studying takes a lot of time.

III. Study Skills - Note that three components are common to all effective study strategies: (1) Repetition (repeating the information in your own words / images), (2) Effort (making a conscious effort to understand and
remember the information being studied),(3) Time (there is no quick and easy way to learn, it takes work, time, and motivation!).

IV. Test Taking Tips - taking tests effectively so that you can demonstrate what you know is a skill just as studying is.

STATE OF MIND
Remember that you are here because you want to learn, nobody is forcing you to go to college. Many students think of their classes as obstacles that they have to get past. Don't create barriers to learning by thinking of your class work as an obstacle. Make an effort to remind yourself that you want to understand the material being presented! It is all part of a process preparing you to be the professional that you want to be (otherwise why are you here). Even in required courses that do not seem to apply to your goals there is valuable information. Look for the positive - the more you learn the more you will understand the world around you and the more self-reliant you will be.

TIME MANAGEMENT
Effective studying takes time, lots of time. It is imperative that you manage your time effectively. Draw out your weekly schedule and plan your study time (schedule study periods just like a class). A rule of thumb is that you should plan to study for a minimum of 2-3 hours for every unit the class is worth each week (thus for a three unit class you should plan on spending 6 - 10 hours a week studying outside of class). Don't wait and try to pack in unreasonable numbers of study hours before a test, plan ahead. Study 50 minute hours with 10 minute breaks, and don't forget to schedule in time for yourself, to work out at the gym or spend time with family members. With efficient time management you can study effectively and have a life.
Manage your time and commit to a study schedule. Consideration of some of the following points will help you make a schedule that will work for you.

1. Plan ahead. Mark on your calendar all deadlines for exams, papers etc...(prepare a calendar of the semester).

2. Draw out your weekly schedule. Set blocks of time aside for work, classes, and study. Remember you need time to sleep, eat, and play! so be realistic, there are only 24 hours in a day (create a weekly planning schedule- part of the time management supplement).

3. Stick to your study schedule - establishing and maintaining a regular schedule of study so that you know what you are going to study and when will dramatically reduce wasted time.

4. Create a checklist of work that must be done each week (i.e. chapters to be read...) and hang this list at your study area. Check off items as you complete them.

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5. Utilize odd times, don't waste that hour between classes, use it to study or to take care of other tasks. The more you get done now the less you have to do later.

6. Study as soon after class as possible while the information is still fresh in your mind, it will take more time if you wait and have to relearn it.

7. Limit yourself to 2 hours on one subject at any one time. After 2 hours for most students, their ability to concentrate will decrease as will the effectiveness of their studying. Take a break, then switch to another subject. Short, frequent study sessions are much more effective than one or two marathon study sessions. Do not procrastinate so that you have to cram!

**STUDY SKILLS**

Once you have established a schedule to study you need to get the most out of that time. Several things will help increase your effectiveness. As already mentioned, maintaining a regular schedule is one. Another is creating a comfortable environment for studying that is free of distractions. Finally there is the What and How of studying.

A. **What to Study:**

Generally all the material that you should know for an exam is presented in lecture or in your lab work. Therefore you can use the lectures and labs as a guide to what is important and emphasize this material in your studying. To be most effective your lecture/lab notes must include all of the key points covered in lecture/lab. As an aid many instructors provide lecture outlines. These can be very helpful as a guide but should not replace good note taking. DO NOT take this to imply that you do not need to read the text. Textbooks often may be thought of as a supplement to the lecture/lab that you can use to preview the material, to fill in gaps in your notes, to answer questions, and for review. They are, however, a critical component in your learning and should not be omitted.
Note: Different instructors utilize textbook information to different degrees. Some test only from lectures while others test heavily from the text (even if the text material has not been discussed). It is up to you to determine what your instructor expects of you. In either case it is rare for an instructor to discuss something that they do not think is important.

1. If it is discussed in lecture it is important. The more time spent on it the more important it is.

2. Know the terminology - if you can't speak the language...

3. Note and study all figures presented in lecture and lab.

**B. How to Study:**

There is no single "best" way to study. Each individual must find the best method for them. This may even vary for a given individual depending on the subject matter. However, three components are common to all:

(1) repetition,
(2) effort, and
(3) time
Repetition is a key component necessary to move information into memory. As an absolute minimum you should plan to review the material three times, in lecture, in reviewing the lecture, and in reading the text. This should be active review during which you organize your thoughts and test yourself. Actively studying requires effort, learning is hard work. It also takes time, there are no shortcuts. The following is a compilation of many of the techniques used by successful students to study. The more of them that you can incorporate into your collection of skills the more likely you are to succeed.

1. Preview material to be presented prior to attending lecture or lab.

2. Read and highlight important sections of the reading (note: highlighting is like note taking, highlight only enough to remind yourself of the key information presented.

If time is short - preview the material briefly to identify key terms and concepts. This can be done in several ways:

1. Read the chapter summary.

2. Read section headings and bold type.

3. Inspect figures and read figure headings (note: at some point you should read the text in detail and highlight as above).

4. For lab: prepare a lab notebook in which you rewrite all procedures in your own words along one half of each page. Also you should prepare a data record sheet (what data should be recorded and in what form should it be presented). During lab record your notes and data along the second half of the page adjacent to each of the steps.
5. Take good lecture notes - good note taking is a valuable skill that is difficult to master.

6. Do NOT try to write everything that is said, just not enough to remind yourself what was discussed (your notes should be clear to you but not necessarily to anyone else).

7. Note all figures presented in lecture for later review.

8. Rewrite your lecture notes as soon as possible after the lecture (note: this should be an active process - do not simply re-copy your notes, think about what you are writing and write it in your own words).

9. Read through the text (or reread) and fill in the gaps in your lecture notes (some students like to take a separate set of notes from their reading and then combine their lecture and text notes).

10. Convert your notes into flash cards for review (just making them is a learning process).

11. Make up questions from your notes - this will help you to actively think about the material and may help you to predict what kinds of questions may be on the test.

If you are finding that no matter how hard you try you still miss parts of the lecture try taping the lecture and review the tape to fill in missing information (warning: DO NOT waste your time listening to the entire lecture again, just use it to fill in gaps in your notes. Beware of the tendency towards reduced vigilance in
lecture, just because the tape recorder is running does not mean you do not need to listen).

1. Draw out flow diagrams of complex processes or relationships. This can be a simple or very complex "map" to help you visualize relationships (note: if you learn the relationships and the general concepts it is often possible to reason out the details, however, learning the details alone often is not helpful in learning the concepts).

2. Draw simple anatomical pictures illustrating structures and relationships - these do not need to be artwork but should be clear to you.

3. Use additional resources when needed (i.e. texts) - frequently texts used in prerequisite classes can provide a clear overview of the general concepts helpful in keeping perspective (in advanced courses it is possible to lose sight of the big picture).

4. Different texts may present information in different ways that are clearer to you.

Warning: it is easy to become overwhelmed if you try to use all of the resources that are available. Keep it simple, use the resources that are assigned and turn to alternate sources only when and if you need them.

4. Test yourself - self-study questions can often be found at the ends of chapters, in study guides, and in computer applications. If old exams are available use them (but not as a primary study source).

5. Go through old exams as you study then again as review prior to the test.

6. Warning: do not use self-study questions as your primary method of study but as way to review and evaluate what you need to study further.

7. Review what you have studied with a study group - study groups should not replace individual study but are frequently the best way to review what you have learned.

8. Take advantage of instructor office hours to clear up any questions that you cannot answer on your own.
9. Review and analyze your mistakes on your tests - what are the correct answers, why did you miss the questions, how can you improve your studying and test performance?

TEST TAKING TIPS

1. When the time comes to take the test do not just jump in and race to finish. Take your time, relax, and do your best. Remember, it is only a test.

2. Read the questions thoroughly - make sure you understand what is being asked. For multiple choice questions, read through all choices before picking an answer.

3. Read through the test and answer what you know first - don’t get stuck on questions you don’t know, skip them and come back to them later.

4. Go back and work through the questions you were not sure of the first time (warning: if you look at a question that you answered and you think you should change your answer but you still are not sure - don’t change it! Only change answers that you are sure are incorrect).

5. Do not leave any questions blank - watch your time.

6. If time permits review your test to make sure you didn’t leave any questions blank, or to double check questions you were unsure of (note previous warning).
7. Watch for danger words in multiple choice and true-false questions like "all," "always," "every," "never," and "none". Because there are no exceptions to the statement when these words are used the statement is often false.

8. Essay questions often require you to make a statement that answers the question and supports it with facts. For this type of essay question instructors do not want your opinion, they want to see how well you can support your point. Warning: be clear and complete; never assume that the instructor will know what you mean - answer the question as if explaining it to someone who knows nothing about the subject.

9. Be neat - if the instructor cannot read it they may not give you credit for it.

HOW TO STUDY BIOLOGY (and succeed)

There are no tricks or short-cuts when it comes to succeeding in Biology classes at Napa Valley College. College level Biology is difficult and there is no substitute for hard work. But what is meant by "hard work"? One component is time spent on task. When we speak of time, we should consider both the quantity of time spent and the quality of time spent. There is so much material to be understood that a substantial time commitment is required. There is time spent in lecture, but also time spent preparing for class, reading the assigned pages, upgrading notes, and studying for tests (which might cover as many as ten chapters). Yet, a student can devote a lot of time to these activities and still do poorly in Biology. This is because the quality of time spent is also an important factor. Many students become discouraged when, though they spend hours and even days studying for tests, they still get unsatisfactory scores. Usually this occurs because what they
do when they study is low-quality work. What are some examples of low-quality work? One example would be reading the textbook just to get the reading assignment out of the way. A student who reads properly, on the other hand, reads with a critical eye, constantly asking him/herself questions like: "If I had to teach this to someone, could I do it?" or "What if this process where screwed up somehow; then how would the results differ?" or "The text’s treatment of this topic differs from what I learned in high school (or what I learned in class today); what question could I ask in class that might clear this up?"

Another example of low-quality work is going over and over your class notes. This is an activity that assumes one will be tested in a low-quality fashion, i.e. with test items that require you to do nothing but recall and repeat. This is a false assumption. You will be asked to integrate concepts from different lectures, to apply the principles of biology covered in class to situations that were not covered in the lecture or text, to evaluate new situations in light of the material covered during the test unit. High-quality work entails preparing for such questions. Preparing entails organizing the mass of new information in such a way that it helps you understand the way the concepts are related to each other. A final example of low-quality work is coming to class regularly and just taking notes. Why is this low-quality work? Because many people go on auto-pilot when they takes notes. They switch off their brains and become passive sponges or tape recorders, assuming that later on, they will only need to act like a pair of speakers to play back what was written down. As in other things, your attendance at lectures can be either low-quality or high-quality.

High-quality attendance entails being critical during the lecture, asking questions like: "Why does it work that way?" or "How do we know that? What is the evidence?" "How does that relate to what the professor said the other day about...?" There is a world of difference between questions such as those listed above and questions like: "Could you repeat that?" or "Could you spell that?" or "Do we have to know this for the test?" The answers to these questions might be important, but asking them does not indicate that critical thinking has been going on, as do the earlier questions.

As you can see, the successful student will necessarily have to work hard. The suggestions above are labor-intensive; they require more mental gymnastics. But just as a gymnast would be foolish to expect to succeed at a complex maneuver on the first try at an important competition, as foolish would be a student who
expected to pass tests requiring higher-order thought processes without first practicing these same processes. Successful students take pains to carry out some sort of lecture follow-up activity. For many, this means rewriting their lecture notes. A lot of students find this activity to be very tedious. An alternative follow-up activity is a strategy known as Concept Mapping. Like rewriting notes, this is an activity that helps you reorganize the information in a way that conforms to your mental "landscape." Better than rewriting your notes, it helps you to discern the patterns and relationships between concepts. Much research supports the effectiveness of this strategy in helping students learn complex material. The process will be detailed in the presentation that accompanies this handout. Below is a summary of the steps in constructing a concept map, followed by guidelines to use in constructing the most helpful maps possible.
Steps in Making a Concept Map

1. Make a list of the concepts from the lecture.
2. Rank the concepts from most general to most specific.
3. Start each map at the center of the top of the page with the most general concept, which will generally be the chief topic of a particular lecture. Below it, place the second-most general concept(s), etc...
4. Circle these two concepts and link them with a solid line.
5. Label the line with a linking phrase.
6. Work your way down the page, adding increasingly specific concepts and looking for crosslinks, which should be drawn with dashed lines.
7. Add details (examples).
8. Do a second version of the map with the goal being to add formerly unnoticed crosslinks and to organize the map so that it flows as logically and as clearly as possible.

Guidelines for the Most Helpful Maps

1. A typical 50-minute lecture should contain at least 20 (and not more than 45) concepts. Concepts are usually nouns.
2. Label ALL links and crosslinks with linking phrases. Links generally consist of verbs, but other words may be used where appropriate.
3. Circle the concepts, leave examples encircled.
4. Each concept should only appear once in a given map. Redundancy of concepts usually indicates that you missed an important conceptual relationship.
5. Concept maps should flow down the page only.
6. Concept maps should NOT resemble flow charts or chronologically based outlines of the lecture. They should not be sentences with some words diagrammed. An important goal is to accurately relate as many concepts as possible using Crosslinks. Maps with long strings of concepts or with several isolated and unlinked branches indicate misunderstanding of the goal of concept mapping.

Further Suggestions:

1. Attend ALL lectures: This gives you a good idea of what the professor(s) think most important. It also allows you to learn by hearing and seeing simultaneously -- much more effective than either one of these alone.

2. Make a regular appointment with your instructor to go over questions you have,
or test your own understanding by explaining material back to him/her. It is always better not to be an anonymous face in a crowd -- get to know your professors.

3. Come to class prepared by having outlined the assigned pages ahead of time. This will help you make more sense of the lecture as you listen to it and this, in turn, will help you to...

4. Engage your brain in the lecture. Don't allow yourself to become a note-taking automaton. Think! Be critical! Be skeptical! Ask questions! If you are shy, ask questions after class or during office hours.

5. Put proper closure on each lecture. Within 24 hours of each lecture -- the sooner the better -- (1) ask yourself what the lecture was about without using your notes, and (2) write your answer in the form of a concept map. This is the best time to spot points of confusion or discrepancies between text and notes, which you should write down and follow-up on. It is very important to spend time in this fashion if you are serious about succeeding in biology.

6. Pay attention to the figures in your text, especially the summary figures, like Fig. 17.26 in Campbell’s Biology, 7th edition. Figures are expensive to produce and publishers try to use them sparingly in order to reinforce main points.

7. Budget your time. There is such a huge amount of material to be mastered that studying cannot be put off into an all-night cram session before tests. This is a time-tested recipe for failure; if not failure of the test itself, then failure to understand biology. Will you have a cumulative final exam? What is your plan for keeping material from the beginning of the semester fresh and in mind? You would be well-advised to have such a plan.

8. Don't be a hermit. Once you have studied a good bit on your own, get together with a few others who are interested in understanding biology in order to bounce questions off each other, compare concept maps, create sample test questions, explain concepts to each other, and to be able to answer your colleagues' questions regarding those same explanations.

9. Don't miss the forest for the trees. Concentrate on the concepts, not on the minutiae. You will not be asked to recall picky details or to memorize tables (like
the genetic code). You will be asked to apply broad concepts to solve specific problems.

Biology Reading Tips

1. IMPORTANT: Have you taken the reading assessment test? Can you read at a level that is adequate for this text? In general, all college biology texts are at least 12.6 grade level and some are considerably higher. If you read at the adequate level, then the following suggestions may be helpful. What follows is a summary of strategies that are being used by students who are successful in biology. AND YOU CAN SUCCEED TOO!!

2. Slow down!! The flow of a biology book is not like the flow of a novel. A novel can be read effortlessly, smoothly and rapidly, but biology books cannot. If you are reading a novel and are somewhat distracted, you can still get the idea of what it is about. When you are not concentrating on biology you will get very little out of it and it will seem more difficult than it really is.

3. Every word counts. Biology books are usually not repetitive, so there is little chance of picking something up from reading on. Writers of biology texts believe that extra words and repeats get in the way of clarity.

4. It is best to tackle each chapter at least three times. The first time you should skim the chapter, noting topic sentences, words in bold print, all tables, diagrams and summary charts. This is best read before the lecture. The second reading
should be in more detail, studying each area and not proceeding until each section is understood. Reread each section as many times as necessary until you understand its meaning. Mastery can take minutes or hours or days. The last major reading is for writing down terms and definitions and important concepts (see #6 below).

5. Talk to yourself as you read. Explain what you have read aloud and make up your own examples to better understand what you have read. Rereading the material aloud, especially in your own words helps clarify the information. Hearing yourself makes a lot of difference.

6. Words and symbols of biology have specific meanings. Each time you come to a new term or concept, cover up the text and see if you can express the idea aloud in your own words. Write down all the words you do not know. Emphasize words in bold type. Whenever possible write out the definitions in your own words. Strive for understanding the definitions so that you can easily state them in your own words; you are more likely to remember them that way. By saying it out loud and writing it, you are more likely to recall it later, when needed.

7. Study all diagrams and charts. They condense a lot of valuable information. Cover up and see if you can visualize them.

8. Write as you read:
   a) During your first reading write nothing in the text.
   b) Do not highlight it slows down reading and it is often used as an excuse for not concentrating.
   c) In a later reading, call attention to important words or phrases by underlining them (do not over do this). Complete sentences or paragraphs should be bracketed and not underlined.
   d) Write summarizing statements to yourself in the margin.
   e) Make notes to yourself right in the text.
   f) Note questions that you need to have clarified.
   g) DO NOT WORRY ABOUT THE RESALE VALUE OF THE TEXT.

9. Record all key points on a separate sheet.

10. If there are study questions at the end of the chapters, be sure you can answer them. They are good practice for the exam.
11. Make flash cards with terminology and concepts.

12. Keep testing yourself on a separate sheet of paper.

13. Without looking back, write out and say aloud the important points.

14. Create tasks for yourself as you read the text. After reading an example and working it out for yourself, try to think of other examples that would fit the idea being discussed.

15. Use more than one book on the topic you are studying whenever possible. Pick books that appeal to you. If you are very verbal, a book with long explanations is likely to be most helpful. If you are more visual, you might choose a book that has more illustrations.

16. Read the chapter before, and again after, class. You will get the most out of class if you have read the material before the instructor presents it. Even if you felt you understood the material in class, read it over again in the text. The more you review it the more likely you are to recall it.

17. If possible, have a friend or family member quiz you on your notes and text information. Done regularly, this commits more information to long-term memory.
Biology Study Skills

1. Successful biology students have told us they study a minimum of 2 to 3 hours per day, seven days a week, throughout the semester.

2. Biology is hard work, so be aggressive. Take it as a challenge and give it your time and your energy. Do not take it with lots of other hard courses or a busy work load.

3. Know and understand all your terminology. This is one of the keys to success in any field. In biology it is extremely helpful to begin by studying your Latin and Greek roots. This is the basis for many seemingly difficult terms. Study these roots. Make 3" x 5" flash cards to help you memorize them and later do the same with your terminology.

4. Biology teachers have reported that if something is brought into the lab, it is guaranteed that you will be tested on it. So pay attention to whatever is brought into the lab, even it’s a person’s name.

5. Chemistry is not a prerequisite for taking biology at Napa Valley College, but taking a chemistry course (like Chem 110) before, or at the same time you are taking biology would be exceedingly beneficial.

6. Make it a practice to read over the topic or chapter before going to your biology class.

7. Attend all classes and be an active listener. It is important to be alert and concentrate on what is said in lecture. Successful students take full and comprehensive notes, writing down about 66% of what is said in lecture, while failing students write half as much. It is most important to stay current. Do not allow yourself to miss classes and fall behind or the entire course will become an effort and a struggle for you.

8. After class go over the material as soon as possible and again eight hours later. Studies have shown that you are more likely to remember the information later. Fill in all the missing words or incomplete explanations. Recite important concepts in your own words.

9. Always remember you have the right to ask questions before, during and after
class. See your instructors during their office hours for help. Notice when you are first does not understand the material and seek help immediately.

10. Read and study all your textbook explanations. You may wish to use at least two or more books. These books are often available in the library. Each book has a different discussion and examples on your topic, and one of these is likely to be helpful to you.

11. Whenever possible explain aloud to another person what you are learning. Work with a classmate and explain terminology and concepts to each other.

12. Describe in your own words the similarities and differences between the different concepts you are learning. Do this aloud with someone else.

13. If biology is your most difficult subject, then always study it before all other subjects. You must study biology when you are most alert and fresh. Make sure to take 5 or 10 minute breaks every 20 to 40 minutes in order to clear your mind.

14. Write up summary sheets of biology terminology and concepts and review often. The more you review the more you' will remember. Also, visually picture the terms in your mind’s eye. Visualizing is a powerful technique for remembering terms. Break words into small chunks and picture each chunk until you can recall it. Then put the chunks together. Remember, the knowledge of roots can be extremely helpful.

15. Making up mnemonics memory techniques may be fun as well as beneficial. For example, if you need to remember the 12 cranial nerves you can take the first letter of each nerve and make up a sentence where each word begins with the first letter of each nerve.

16. Create sample tests for yourself and test yourself often.

17. Give yourself timed tests similar to those you expect in class. Time yourself with a kitchen timer or an alarm. Practice, practice, practice.

18. Review the types of errors you make and types of questions that cause you difficulty. Give yourself more practice in these areas of difficulty.

19. If possible, have a friend or family member quiz you on your notes and text information. Done regularly this commits more information to long-term memory.