How to do well in Cell Biology

I. **Think about the goals of the course.**
   A. Read the syllabus and listen closely when your instructor discusses coarse goals.
   B. Read the preface and introduction in your textbook. Your instructor picked the book to go with his course goals. The goals of the course and the text are similar.
   C. Remember - if you don’t know where you are going, it is difficult to get there.

II. **Hints for studying.**
   A. **Active vs. passive learning.**
      Many experts stress the difference between active and passive learning. Definitions of each vary, but passive studying involves trying to make yourself a sponge to “absorb the material”. A student who is using active learning more nearly resembles an explorer. Active learning usually helps long-term memory (and often short term memory). Perhaps more importantly, an active learner can more easily adapt the information to new uses. This will be important (perhaps the most important) component of success in college and beyond.
   B. **A strategic plan for studying.**
      1. First: Understand the material. At this point, do not worry if you cannot remember details and don’t particularly worry if you can reproduce the logic on an exam. Keep at it until you really understand it. Success at this point will mean you could explain it to others in your own words. Most people will find this the hardest of the four steps. However, if this is not done, attempting the last three will not help much.
      2. Second: Ask yourself “Why is this important?” If you can answer this you probably will be in good shape. (An answer of: “because it will be on the test is not sufficient’!). If you cannot answer this for yourself, ask your classmates or the instructor.
      3. Third: Figure out the relationship of the subject to the rest of Cell Biology and ultimately Biology in general. If you are really doing a good job things should magically “come together.” Note: this will almost never happen the night before the exam.
      4. Last: Worry about the details. You do eventually need to get this far. However, if you passed through the above three stages, you will find that you already know (or can quickly figure out) a large portion of them. Others can be placed on the card you are allowed to bring to the exams.
   C. **Study enough.**
      The college wide assumption is most students need to study 2-3 hours
outside of class for every hour in class. Some students will need to study more. Since you have 3 hours a week in class, you should spend 6-9 hours every week outside of class.

D. Study the basics first.
If you cannot spend as much studying time as you would like, spend the greater portion of your time in the first few weeks of the course and the first few lectures on each subject. If you really understand the basics, then the rest become very much easier. Studying the details without a firm grasp of the basics is a fruitless exercise. An hour studying at the beginning of any subject is probably worth three at the end.

E. Keep up. In some ways, Cell Biology is more like math than like history in that one component builds logically upon another. If you get behind, it become harder and harder to stay within striking distance of the class.

F. Prepare for the lectures.
Studies suggest that reading the section headings and the chapter summaries and looking at the illustrations before lecture markedly improves comprehension and retention of lecture material. Alberts is very well suited to this approach and the illustrations are superb. You might also consider scanning the text on each subject before it is discussed in class. In a pinch, at least look at the outline I will supply before the lecture. If you can understand and appreciate the important points made in lecture, you will be able to fully profit from it.

G. Use your text effectively.
1. Develop a context for the facts and ideas you will be studying. Many students scan the material and illustrations trying to get a general idea of the topic. At this point try not to worry too much about whether you know all the vocabulary or understand all of the ideas.
2. Read the material. Here you must concentrate. Many successful students take a set of reading notes; others add their notes to the lecture notes. If you have real problems with a section, make up a list of specific questions you can ask friends or your instructor.
3. Think about the material. Try to summarize the important points in your own words.
4. Do not ignore the illustrations. Alberts et al. has superb illustrations. Often these communicate the critical ideas much more clearly than text alone.

H. Organize your notes. Many students combine my outline with their notes. Others reorganize lecture material, integrate it with notes from the book and copy it over. The time required to do this is not lost but rather invested - especially if you make sure you understand the material while doing this.

I. Use study groups.
1. This is a good place to get questions answered. Even if no one person knows the whole answer, there is often enough expertise in the group
to work it out. If nobody knows, and everyone thinks it is important, it is probably an excellent question to ask the instructor.

2. This can also be a good place to test yourself and find out what you know (and don’t know).

3. One of the most effective ways to really learn the material is to teach others. Both teacher and learner are really learners.

4. The people in your study group are your peers. Their teaching methods, vocabulary etc. will give a contrasting view of the material that can be useful in understanding it.

5. The smaller size of your study group encourages individual attention.

6. Do not let your study section become crammers.

III. Preparation for the test: The easy part if you have done the above.

A. Look at last year’s exam. However, I suggest looking at this only after you have done the bulk of the studying. It does you little good to prepare for last years exam.

B. Take the previous night off. Get some sleep.

C. Write out details that you cannot remember on a 3x5 card which you can take into the test. (You can use any information you can hand write on one side of the card)

IV. Taking the test:

A. The two parts:
   1. Multiple, multiple choice
      a) Purpose: Primarily to test range of knowledge and secondarily depth of understanding.
      b) Why multiple, multiple choice?
         (1) Allows me to test many ideas and/or facts in a single question.
         (2) Makes it more difficult to guess at the right answers. This in turn makes the grade less subject to “test taking ability.”
      c) Strategy:
         (1) Multiple T/F.
         (2) Recognize that there is no reason why all answers might not be true or all answers false.
         (3) Carefully read the question. I do not attempt to be tricky, but I do try to pick plausible wrong answers. Just because the answer uses vocabulary we used in lecture does not make it right.
   2. Medium answer / short essay
      a) Purpose: To test range of information mastered, depth of understanding, and ability to use the information to solve novel (at least to you) problems. Because it is clearly impossible to test all concepts at this level in an exam of finite length, only a representative portion of the important concepts can be covered in any test.
      b) Strategy:
(1) Read the question.
(2) Think before answering to be sure that you answer the question as written.
(3) Focus on the important issues implied in the question.
(4) Do not waste time or space including information that is not asked for in the question.
(5) Reread the question - be sure your answer matches the question as written. You will not get credit if your answer is the right answer to a different question.

c) Compare/contrast A & B (or describe/list similarities and differences between A & B). I occasionally ask that you compare and contrast two processes or ideas. Because these cause so much grief I would like give you a few hints.

(1) Strategy:
   (a) Think of ways in which the two components are similar and ways in which they are different.
   (b) Organize the information to ensure that your reader (me) can determine exactly what you are comparing or contrasting. Some students will start discussing the first concept and then comparing / contrasting the second (i.e. A has the following traits...... B is similar to A in .......... and different in ............), others will compare/contrast trait by trait (i.e. A is similar to B in .........., A is different from B in that ..........). Either is acceptable as long as the comparisons are valid.

(2) Examples of a good and bad answer to the question “Compare/contrast the energetics and mechanics of movement in a helicopter and a pig.”
   (a) Poor:
      A pig is a mammal.  
Pigs obtain energy by eating a wide range of plant and animal material.  
A helicopter has several rotating parts.  
A helicopter can fly.  
A pig walks or runs.  
Pigs can breathe.  
Helicopters can move at more than 60 miles per hour  
Helicopters have internal combustion engines  
(The above has no successful comparisons)
   (b) Good:
      Both a pig and a helicopter can move from place to place.  
In both cases the energy for movement comes from oxidizing organic molecules.
In both cases the oxygen used in oxidizing the organic molecules comes from air.
The energy for a pig's movement comes from a wide range of plant and animal tissue while the energy for a helicopter comes from petroleum products.
The helicopter has rotating parts responsible for movement, pig movement uses no rotating parts.
Pigs move by walking or running, the helicopter moves by flying.
Helicopters can move considerably faster than pigs.
(This answer has seven successful comparisons)