

## Some Thoughts about Student Success

According to information provided to the Sierra College faculty during a meeting addressing student success, approximately 70-80% of the students initially enrolling in this college (and others throughout the nation) are ill prepared for college level coursework. This presents instructors and students enrolling in microbiology with a significant challenge. Microbiology is a rigorous college level course. As your instructor, I have standards to uphold and a specifically documented course curriculum to follow. Still, I want all of you to succeed! I want every student in my class to have a successful learning experience. For most of you, this will mean that you must achieve a grade of "B" or higher, because that is what you will need to gain access to the program of your choice. Many of you are well equipped to accomplish your goals, and for you the learning process will be easier; not EASY, but easier than it will be for students entering this class with a poor foundation and/or poor study skills. Unfortunately, some of you do not fully understand what is required of you in the learning process.

Having recently attended a statewide Student Success Conference, and having given our specific situation considerable thought, I believe I can give those of you that are ill prepared some concrete suggestions for improvement. I want to do this for you, but recognize that you are ultimately responsible for your own learning experience. Hopefully you will take advantage of this opportunity, and by working together we can improve your chances for success.

### **Here are some important notes from the conference:**

**Study technique is often the problem** – Science is different from other subjects in that it often involves sequential information arranged in a hierarchy and involving scientific terms, symbols, etc. Students learn in steps and if they miss the foundation (the basics), they never catch up. Although learning in the sciences involves more than just the memorization of facts, memorizing is essential and requires repetition. Memory decays as a function of time and decays fastest after the initial learning steps. It stays better if the information makes sense, and if it is repeated. The more effort applied during the original effort, the better the information will be retained. Information practiced beyond the point of mastery is much more likely to be held in the long-term memory.

**What does not work** – Simply listening in class will not change the forgetting curve. Rote rehearsal without meaning doesn't help you to learn. Rereading notes and other shallow processing steps, e.g., rewriting notes and waiting until the last minute to review is not beneficial in the long term. Rereading notes can actually hinder learning because it acts to fool you into thinking you know something when in fact you don't. Seeing something and thinking it looks familiar is **not** true learning. The feeling of knowing something when you see it written can divert your attention and give you a false sense of security. Similarly, having something explained to you is not learning. To learn new concepts, you must be able to explain them to someone else.

**About Brain physiology and learning** – The human brain contains about 100 billion neurons with the capability of forming trillions of connections. Memory requires developing specific connections or neuronal pathways along which signals can travel. Synapses (gaps between neurons) allow for electrochemical communication between neurons, and these change with use. Memory involves

strengthening connections by facilitating neuronal circuits, i.e., making it easier for signals to pass. To facilitate neuronal circuits, you have to use them. This is where repetition comes in. Neglected connections tend to break down over time, and memory fails. Early exposure is significant because connections get prioritized and tend to stay that way. The brain changes in responses to the environment and experiences of the individual. Adults have more difficulty learning in part because they already have multiple well-established connections. The brain has a good deal of plasticity, but requires practice to maintain new circuits. So learning requires making connections (neuronal circuits), and relating new information to something you already know. The more meaningful the connections, the longer the memory will be retained. No change occurs in the brain during one exposure to new information. Multiple exposures are required. **Learning requires repetition.**

**So what isn't wasted effort?** – Intention, repetition, emotion and depth of processing are all factors that influence learning. Intent is, unfortunately, the least significant factor. Emotion can influence learning (it is easier if you enjoy it); but depth of processing and repetition are the most important. Elaborative rehearsal is required, and involves relating what you are trying to learn to what you already know. Make sure you have time to review, and recognize that the first review must occur quickly, e.g., as soon after class as possible. Forgetting occurs rapidly within the first 24 hours, so review the first time within 24 hours of lecture. Review again on the 2<sup>nd</sup> day, the 3<sup>rd</sup> day, the 4<sup>th</sup> day, etc. and by quiz day you will know the material. By applying this method, test anxiety can be overcome and you can become more confident.

**How you review is critical** – Review by **recall**, not by recognition (this is why 3X5 cards work); form relationships, engage in elaborative rehearsal, use self-exams, write outlines, etc. Most of the time, just reading over your notes will not allow you to know new terms or their meaning. You must be able to answer questions without seeing the answers or explain things to somebody else. Understanding a concept when it is explained to you will not work as a study aid, but explaining the concept to somebody else will. So when you work in groups, make sure everyone is on the explaining end.

Sleep and stress will negatively impact your performance. Sleep deprived brains have lower creativity, rigid viewpoints and irritability. Memories are consolidated during sleep so sleep is essential. Problem solving occurs during the last 30 minutes of an 8-hour sleep period, so if you cut your sleep you can't solve problems.

Recognize that the learning curve is not consistently upward, it is uneven and like switchbacks on a trail, must be dealt with realistically. You just have to keep going, and have confidence you will ultimately reach your goal.

**What distinguishes "A" students?** – The "A" students start early. They get a head start and keep reviewing often. Early review is the key! Review early (as soon after class as possible) and then study what you cannot easily recall.