Math and Science Lecture Styles

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You should strive to understand the lecture style of each of your instructors. The more you know about how information is presented to you, the better prepared you can be to accept that information. If you know the thinking behind why an instructor is doing whatever s/he is doing, you can concentrate on the **content** rather than the method of presentation. Here are some common lecture styles and some suggested ways to get the most out of them.

- **The Style:** From the general case to the specific case
  - **What is it:** presenting the underlying principle or concept first and examples of how that principle applies second
  - **Example**: a math class. The theorem is presented first, then problems using that theorem would be shown.
  - **How to get the most out of it**: the moment the theorem is given, ask yourself what special cases or examples would make use of this theorem.
    - Example: If you anticipated a specific situation that your instructor did not illustrate with an example, ask about it. You may find that the theorem doesn't apply in your case, but then you'll learn *why*. Better to learn now than on the exam!
    - This increases your mental engagement and allows you to formulate questions
- **From the specific case to the general case**
  - **What is it:** a common characteristic of several individual cases are displayed first, then unified later by a definition or principle.
  - **Example:** a biology class.

In a biology class, for example, several species of organisms may be discussed in a way that exposes several of their traits. Then, the instructor introduces the definition of the genus that all these organisms belong to, and shows how they all possess the traits incorporated in the definition. You can ask yourself what is similar about all the organisms as the instructor discusses each one, thus challenging yourself to come up with the definition before the instructor gives it to you. Doing this develops important critical thinking skills that are helpful in any discipline. If your definition wasn't inclusive enough, or incorporated a trait that it shouldn't have, ask about it. You may learn of some quite interesting exceptions that exist in the animal (or plant) kingdom!

- **In chronological order**

Although this lecture style is often thought of as appropriate only for a history class, it can be used in technological classes as well. Scientific developments often spring from the previous work of others. A chemistry professor may begin by discussing how the ancients thought of burning, and lead you through more and more modern understandings of combustion. Instead of trying to remember only the most current view, you will benefit greatly by understanding how phenomenon were thought of initially. This type of viewpoint can allow you to free yourself of "that's the way it is" thinking and begin to look at almost everything as up for reinterpretation when future discoveries are made. You ' II be better

equipped - to take your learning a step or two (or more) beyond the current state of the art, and you may find that some exam questions expect you to demonstrate just such an ability.

- **In classification order**

Some disciplines lend themselves to presentation based on how they are classified or categorized. If you keep in mind what category is being discussed, you can reinforce the characteristics of that category each time a new case is presented. In a math class, for example, it's not hard to loose track of a problem's classification (i.e., what mathematical family the problem belongs to) if you are too narrowly focused on a particular technique used to solve the problem. Then, you end up not really knowing what type of problem that technique applies to. As a variety of problems are being presented in lecture, be sure that you can classify them accurately. Only then will you realize the important classification patterns that identify the diversity of mathematics.

- **By analyzing a process step-by-step**

Engineering classes often approach a topic by taking apart a process and analyzing it step by step. If you know the starting point, and the goal of the process, you should be able to anticipate the general steps needed to achieve that goal. This is an excellent way to check your understanding of the thinking behind the process, and to generate questions if your steps don't match the actual steps. A thorough understanding of the step-by-step nature of a process can also expose ideas for future development by examining ways to combine and/or eliminate steps, or to develop new steps.

- **With comparisons and contrasts**

This can be a difficult way to have new material taught to you. After being presented with several comparisons of a new concept to a previously understood one, you may begin to think that you understand the new idea. Then, contrasts are presented, and you feel that you don't understand it at all. The moment new material is presented, begin to compare and contrast them to concepts you already know. You ' II find yourself making all sorts of comparisons to other ideas and thus greatly increasing your understanding of how knowledge relates to other knowledge.