GUIDELINES FOR ACTIVE LECTURING/ACTIVE LEARNING

(HINT: GOOGLE “ACTIVE LEARNING” FOR MORE INFO AND VIDEOS ON WHAT THIS IS ALL ABOUT)

LEARNING GOALS & OUTCOMES

1. To convey various practical considerations when preparing a lecture; working in groups of four:
   - TAs will be able to identify and justify five practical considerations they feel they will need to keep in mind when preparing a lecture.
   - TAs will select a topic (mitotic cell division, early animal embryonic development, gene expression, evidence for evolution, species interactions) and prepare two learning goals and four learning outcomes associated with these for that topic.
   - TAs will be able to describe two types of engagement activities and provide an example of each type that can be used when lecturing on their selected/assigned topic.

2. To convey ways to improve information processing and long-term retention; working in groups of four:
   - TAs will identify three ways to improve information processing and retention using three specific examples for their selected/assigned topic.
   - TAs will write a general outline for their selected/assigned topic.
   - Working individually, TAs will outline, prepare and deliver a presentation complete with learning goals and outcomes by the end of the training workshop.

3. To convey the importance of self-assessment and various means of doing so; working in groups of four:
   - TAs will come up with three aspects of a lecture they feel are important to assess and three means to assess the effectiveness of their lecture.

INTRODUCTION

The purpose of this unit is to give you an understanding of how to prepare a lecture designed to effectively convey information while actively engaging students in learning. Preparing an effective lecture requires significant effort and dedication, but the payoff of enhancing students’ (and your own!) understanding and interest is well worth it. Each of you will ultimately develop your own lecturing style that will capitalize on your individual strengths as these become evident to you. Here we outline several factors to consider when preparing and delivering a lecture.

This unit is divided into the following sections:
I. An overview of the practical considerations for preparing a lecture
II. Key points in preparing a lecture
III. Ways to improve information processing and long term retention.
IV. A self-assessment checklist for evaluating and getting feedback on a lecture.
V. Notes from Arif Fazel, an FSU graduate student, on what he has found most important in becoming an effective lecturer.
I. PRACTICAL CONSIDERATIONS

Every lesson includes:

Learning Goals (broad objectives; what students should know or be able to do)
Learning Outcomes (“By the end of this lecture students will be able to...”; such as list, compare, describe.)
Learning Activities (these help students achieve the learning goals)
Learning Assessment and instructor self-assessment

Decisions:
Does lecture convey all information or are students asked to get supplemental information on their own?
What medium to deliver information: PowerPoint slides? Doccam? How much information on slides (full information? Slides with blanks? Supplement with doccam?)
Posting lecture materials (usually slides): in totality? slides with blanks? podcasts?
What supplemental materials to utilize (YouTube videos, animations, handouts, podcasts, animations, tutorials, etc.)

Delivery:
Practice and time your delivery
Pay attention to voice quality and volume
Be attentive to the quality of PowerPoint slides (simplicity, uniformity, single message)
Lecture to the room – vary eye contact, be mindful of voice
Get feedback from students and colleagues on lectures
  - e.g., have students pick up index cards upon entering class on which to write comments, questions

Active learning:
engages students during lecture and can enhance information processing and reinforce learning; be sure to allot sufficient time for activities

1. Use of questioning

Benefits: questions provide a real-time assessment of student learning
students have an opportunity to process information in class
an opportunity to learn names
positive effect on classroom atmosphere
student answers can provide new instructional opportunities
e.g., an “unexpected” answers
encourages students to ask questions themselves
Considerations:  incorporate questions on slides as reminders or use “clickers”
  consider high level/low level questions
  e.g., Bloom’s Taxonomy
  allow time for students to process the question and repeat it
  have backup questions ready
  encourage and reinforce student participation
  e.g., ask student’s name & repeat it
    repeat student responses for all to hear
    deal with incorrect responses with tact and
delicacy (be encouraging and use backup
questions)

2. Group work
   Benefits:
   experience: life is a group activity!
   a positive effect on classroom atmosphere
   peer learning has been shown to be effective
   includes students that might not otherwise be engaged
   breaks up lecture
   can lead to study groups outside of class

Can utilize:
“clickers”
concept maps
strip sequence
1-minute questions
think-pair-share
2-3 minute essay
problem-solving
collective brainstorming
arguing from evidence
correction detection
inquiry based exercises
case studies
longer outside-class projects

3. “Clickers”: here is a nice video on using (and the usefulness of) clickers:
   http://www.youtube.com/watch?v=z0q5gQfQmng&feature=related

Benefits:
actively engages students
provides a real-time assessment of student understanding
follow-up explanation of wrong answers can enhance learning
  e.g., “Why did you choose this answer?”
“Why is this answer incorrect?
positively affects students’ participation in class in general

II. LECTURE PREPARATION

Defining and Limiting the Topic:
The topic of the lecture may be assigned or left to your discretion, but there is still usually latitude in terms of what angle you take and which aspects you choose to highlight. Starting to prepare a lecture without a precise vision in mind can lead to all kinds of problems. In order to narrow the scope of the topic, consider the following questions: “What am I trying to accomplish?” and “What should students know or be able to do at the end of the lecture?” You need to be very specific on your answer to these two questions and write explicit learning goals and learning outcomes that should be in alignment with each other.

Keep in mind the audience and its ability level: undergraduates (and at what level), graduate students, or both.

Think about how much time you have. What can you realistically cover in the time you have? Avoid the temptation to do too much or to feel that you need to say everything you know. Let your learning goal(s) guide you and help you discern what to include and what to leave aside.

Structure and Clarity:
Structure is your friend because it can significantly increase your overall clarity. Remember that brilliant material wrapped in a convoluted package is not a successful lecture. Consider issues of clarity from your perspective first: you must clearly organize your thoughts in your own mind. If the structure is not clear to you, then it certainly will not be clear to your students.

That said, there is no single structure that produces clarity in every situation. Based on your topic, you may find it most effective to present: (1) a simple list, (2) a classification hierarchy or outline (with points and sub-points), (3) a chained structure (in which you lead students through an argument or proof step by step), or one of many other options. You may even use several of these models within the same lecture.

Think also about clarity from the student’s perspective. It is strongly advisable to give the students a roadmap or basic outline for your lecture. If they know where you are going, they are more likely to follow along the way. In your delivery, include obvious transitions between points, use repetition to emphasize particularly important points, and explain any technical vocabulary. As the lecturer, the onus is on you to lead people along; the onus is not on them to keep up.

Pre-planning is Critical:
Whether you lecture from an outline or a script, it is important to verify that you have the right amount of information. Typically, lecturers tend to have too much material, so they rush or awkwardly skip over parts of the lecture. Once you begin to time the lecture, you may find that you have to go back and narrow your topic even more. It is much better to do this seated at your computer than standing in front of a room full of students.
Consider the pace at which you are speaking, and be sure to vary your delivery in order to avoid monotony for the hearer. Remember that examples, while very useful for information processing and retention, can take up a lot of time so use them carefully. The same holds true for engagement activities in your lecture, so be prepared that they may throw off your timing. Decide ahead of time how much time you will set aside for the different components of your lecture.

It is also important to be aware that you are teaching to students from diverse backgrounds and skill levels, and also that there are different learning styles (e.g., auditory, visual, kinesthetic or those who “learn by doing”, those who learn deductively as opposed to inductively, etc.). It is therefore wise to utilize a variety of instructional methods.

Use of Teaching Aids:
Handouts, examples, PowerPoint slides, images, models, videos, animations, guest speakers, case studies, graphs, etc., can illustrate and reinforce complex ideas succinctly when used well. They can prompt discussion and the change of pace that they offer can hold students’ interest.

On the down side, these same tools can also be distracting and cause confusion if they are not sensibly coordinated with the lecture, so use teaching aids intentionally and judiciously. With respect to PowerPoint slides, the “KISS” (keep it simple stupid!) approach works best: avoid using gratuitous glitzy text, images and graphical features simply because you think you are “supposed to” can ultimately undermine clarity and student learning.

III. EFFECTIVE INFORMATION PROCESSING:

Components of effective information processing:

Attention
• Lapses in attention by students has been shown to be particularly detrimental during the encoding process.
• enhances memory

Interpretation
• fit new information in with what students know already
• required for learning

Elaboration
• provide opportunities for students to think of information in a number of ways, along with the implications of the new information
• deepens understanding and facilitates recall

Generation
• students actually produce information
• leads to better learning
Retrieval Practice
  • students pull recently learned information out of memory
  • enhances likelihood of recall later
Ways to improve information processing and long-term retention:

Space repetition of important information within and across lectures.
  Cover difficult or important information more than once, spaced across time, using multiple approaches. Research shows that the common approach, i.e. concentrating coverage of an important point within a single lecture, is not optimal for student learning.

Present key concepts from multiple perspectives and demonstrate the relevance of the information in multiple contexts.
  This will enhance variable encoding of information and facilitate generalization of the knowledge. It will also provide coverage for students with different learning styles.
Provide structure to the lecture.
  Provide an outline with headers or a concept map that the students use to facilitate note taking during the lecture. Some instructors then choose to make the detailed information available on the Internet so students can defer note taking and listen without worrying that they will miss something. Research contends that allowing students to defer note taking if they choose can enhance learning. Additional research suggests that students who take notes with an outline had better notes, performed better on tests, and recalled more ideas from the lecture than students who took notes without an outline.

Provide visual images, mental images, or other mnemonic techniques during the lecture.
  Learning can be enhanced by constructing analogies, injecting subject-relevant humor, and strategic injection of enthusiasm. Selective placement of enthusiastic comments within the lecture promotes learning more than overall enthusiasm. Given that 55-minute lectures can exceed typical attention spans, one should lecture for 25 minutes, then do a mnemonic technique (demonstration, class exercise etc.) for 10 minutes or so, then lecture for the final 20 minutes.

Provide opportunities for students to assess their understanding.
  Requiring students to answer questions during the lecture increases the likelihood that students will be able to transfer the learning to different situations. Students can be asked to respond to questions, explain the reasons for their answers, make predictions, generate lists of specific terms, or create concept maps and outlines of the information.

In sum, a lecture is much more than simply a one-way delivery of a mass of notes. It is important to frame and structure your lecture so that students encode the information in a way that renders it retrievable and transferable - which is what learning is all about.
IV. SELF-ASSESSMENT: A TWELVE-POINT CHECKLIST FOR EVALUATING A LECTURE

Venue - Was the venue adequate, in terms of (for example) seating, lighting, heating, ventilation, audio-visual facilities, sightlines? If not, could you have done more to help make the venue more congenial?

Content - Was adequate information available to the students about the lecture course as a whole? Were sufficient links drawn between this and previous lectures/other parts of the course/textbooks/study materials? Was the content of the actual lecture appropriate?

Structure - Was the lecture material organized well such that the students could follow the structure or sequence adopted? Were key points clearly emphasized?

Level - Was the lecture pitched at a level the students could understand? Was any provision made for those who experienced difficulties?

Clarity - Was the lecture clearly presented? Was the information readily understood by the students?

Use of examples - Were examples or illustrations used to help students grasp key points? Did the examples engage students' knowledge and interests?

Handouts and other materials - Did you make appropriate use of handouts or other teaching materials? If so, did these help summarize, amplify or reinforce the lecture material for students?

Audio-visual aids - Were any audio-visual aids that were used successful in supporting students' understanding?

Audibility - Could you be clearly heard even by students at the back and sides of the lecture hall?

Pace and timing - Was the lecture material presented at an appropriate speed? Did you keep to time?

Enthusiasm and interest - Did you present the material in a lively and enthusiastic way? Was students' interest in the subject material sustained or enhanced?

Interaction - Did you create opportunities for interacting with students, e.g. by giving opportunities for questions or comments, or by drawing upon students' interests, concerns or experiences?

V. “MY FIVE E’s”: from Arif Fazel, FSU graduate student and TA

Educate:

We are hired and given the responsibility to teach a course or lab or to assist a professor in a lecture course. If you teach a lab, you are in charge of grades, running the lab, helping to set up the lab, and most important helping your students both in and out of the lab. If you assist in a lecture, you will be grading exams, running review sessions and holding office hours.

Whether teaching or assisting, both of these have the same goal: to educate your students so they are absorbing and learning as much material as they can and progressing through their major. How well your students learn that material is largely dependent on how prepared you are, how you as the teacher present the material, and the effort you make to know and work with your students.

Empathy:

As a graduate student who teaches, it is easy to forget that it was not that long ago when you, too, were a struggling undergraduate biology major. Too many times TAs think that if their students don’t learn something immediately then they will never get it. This is the WRONG attitude for you to take. Biology doesn’t come easily to everyone and chances are that the reason you made it to graduate school and to be a TA is because you had helpful mentors along the way, in addition to putting in much time and effort on your own part.

I have found that the best way to get students to want to learn from you and for you to gain their respect is by empathizing with them. Remember what it was like for you to try and learn biology in college and help them better understand the process. In other words, try to teach in a way that you would have like to have been taught. Think about a professor/mentor you once had that made learning worthwhile and try to emulate what they did while incorporating your own style.

Entertain:

“Make learning fun.” We have heard this saying before but few actually implement it. In all honesty, when professors lecture, many students either fall asleep or don’t even bother to come to class unless there is a test. But as a TA, you will have packed office hours and review sessions that will have a fair attendance and then all review sessions a night or two before a test will be full. Instead of making review sessions just as dry as lectures, make them fun, use animations, do live demonstrations by using student volunteers, bring props (I myself have used a piñata, tennis balls, and rope). Be outgoing and lecture with your students and not at them; that is, get them involved, pose questions to them, and even use jokes! Jokes are a great way to keep students interested and engaged but the jokes should be relevant to the subject you are teaching. Use funny stories or experiences that you or anyone in college can relate to and use them to help explain a process or complex concept. You and your students will be having fun and there may be laughter, but when they go back to study the material they will actually have retained a lot more. And don’t be afraid to unleash your personality. Too many times I have seen TA’s put up a guard or a façade that is completely different from who they really are. As long as you are prepared and comfortable with the material you are teaching, then just be yourself, be outgoing and friendly.
**Effort:**

Graduate school is demanding, especially during your first few semesters as you are trying to balance coursework, figuring out a research project, and teaching. With all of these, your success depends on your amount of effort. As for teaching, the stronger your efforts are, the more likely your students will also work harder; and when your students are succeeding and doing well, that is a direct reflection of your efforts.

**Encourage:**

Being positive and patient throughout your teaching experience is key to doing well and surviving. There will be many times when you will have a few students who struggle with learning. As you develop more experience over time you will be able to pick up on who these students are and you should not be afraid to reach out and offer more help and encouragement to them. Students have a tendency to give up if they aren’t getting the results they expect right away. You should offer them encouragement and let them know that there are ways to improve and that not everything comes easily or will simply be handed to them. With a little extra work from them and help from you they can pass and meet their goals. Keeping a positive attitude and offering positive reinforcement to both yourself and your students will go a long way.