Summary of Tips!

In the session, we focused on only a few strategies for improving student writing. But there are many more strategies that may work for you! Here is a quick summary of some approaches that have worked for us, beginning with those that we discussed in the session.

- Students keeping a writing portfolio - with copies of all of their previous drafts

- Informal, free writing journals (and in class)

- Having students 'record' their writing as a short podcast (they don't realize they are really doing so much writing! I sneak this one in my 100 person class!)

- Student cover sheets on papers

- Examples of editing/mini editing worksheets.

- Have only one major paper with many, many rough drafts due as the 'pre assignments' - developed as mastery learning type. This also forces students to respond to your comments and gets them used to the intensely iterative nature of writing.

- Pass/fail on writing assignments (setting a bar and revising until you reach that bar - some students in one try, some take 6)

-Abstract assignment: give a short paper (*Geology* papers are good ones) with the abstract removed, and have students write their own abstract. After grading them, select a few for the whole class to read and lead a discussion on how best to write abstracts. Abstracts are a highly-specialized, difficult-to-master form of writing, so it pays to focus more course time on them.

-For poorly-written papers, correct grammar and style for just one page or section. This saves you time.

-Use grading rubrics. It's well worth the time to construct a well-designed grading rubric. Students will know how they are being evaluated ahead of time, the grading goes faster, and there will be fewer complaints from students after the assignments are handed back.

-Have students submit their papers electronically in .doc format (course management software such as Moodle handles this well). For papers with multiple drafts, use the 'track changes' feature for comments. This is faster than writing comments by hand, makes it easier for students to incorporate your comments, and gets students comfortable with professional editing.

-Mix up the style of writing assignments through the semester. This will keep students engaged and provide them the opportunity to learn new writing styles. The research paper is just one form of scientific writing. Learning to write for a popular audience is a very important skill too (e.g., op-ed's, commentaries, etc.)

-Have students format their papers like a real paper manuscript. Students will find this exciting and it reduces the number of formatting errors that you need to grade (in-text citations, bibliography, etc.).

-Spend half a class early in the semester leading a discussion on science writing. Most students learn how to write in a humanities setting and not all strategies transfer well over to science writing (e.g., in-text citations, avoidance of direct quotes, separation of results and discussion).

-Have your librarian come in to lead a discussion on how to select reliable sources. Some librarians do this better than others, but it is worth it to try this at least once.

-Have students read and provide feedback on each other's drafts. This not only reduces your grading load, but students pick up writing tips (either on how to write or how *not* to write). Peer grading works best if you give the graders' a structured framework (e.g., a grading rubric).

-If you have TA support for grading, calibrate each assignment with every grader first: read one or two papers together but grade them independently. Also, it is always best if a single grader evaluates all papers (as opposed to divvying up the pile of papers among all TAs); with this approach, each TA will typically grade one writing assignment in its entirety at some point during the semester.

HIGH STAKES AND LOW STAKES IN ASSIGNING AND RESPONDING TO WRITING

Peter Elbow

Most people feel writing as a high stakes activity—speaking as a low stakes activity. But this is largely an accident of how we *use* writing and speaking in our culture.

Writing is learned in school and virtually everything we write in school gets at least *some* evaluation. (If teachers are busy, they'll at least try to circle a few errors and perhaps give an informal grade.) Thus, for most people, the stakes usually *are* higher for words they write than for words they speak. No wonder people associate writing with pressure and anxiety. For us teachers too, writing assignments usually bring pressure since we feel they have to evaluate them and count them toward the final grade—and it's hard if not impossible to give a fair grade to a piece writing.

But even though we tend to use speech much more casually and loosely than we use writing, speech is not as good as writing for low stakes thinking. Speaking is dangerous. Words once spoken can never be taken back. If we say the wrong thing, our friend, supervisor, or loved one never forgets it. Most long term relationships have had to survive a history of things both parties wish had never been spoken.

Writing is ideal for low stakes uses. We don't have to show our written words to anyone unless or until we are satisfied. We can safely explore perplexing, difficult, or scary issues; we can take risks. Writing, then, is ideal for *both* high and low stakes thinking and language.

- *High stakes*—for demonstrating learning. Unless we ask students to demonstrate their learning in essays and essay exams, we cannot trust our final grades. Students often *seem* to know things on short-answer or multiple-choice tests that they don't really understand.
- *Low stakes*—for learning, figuring out, and exploring new and complicated ideas. When there's frequent low stakes writing, high stakes writing goes better—for students and teachers alike.

Specific uses and benefits of low-stakes writing: see the handout.

Middle stakes assignments: "think pieces." These are exploratory pieces that ask students to think through a topic on paper. They are not essays and don't have to be organized around a single point, but they are not just messy freewriting either. They need to be cleaned up enough so they are not unpleasant to read. Describe them as thoughtful letters to an interested friend.

Consider a ritual of a weekly think piece—just a couple of pages. They make students do the reading on time and come to class, and they need little or no response (see below).

Assignments can be open ("Write about what's interesting to you in this week's reading"). But think pieces can also be used to specify a particular *intellectual task* for students to engage in as they read (e.g., *"Compare these two concepts from the reading: . . . ." "Compare this concept from the reading to some experience from your lives." "Write a short story that brings this concept to life."*) Learning is vastly enhanced if you take five to ten minutes at the start of class for students to read them out loud to each other in pairs or in small groups on the day they are due.

High stakes essays.

- Avoid the single final "**terminal paper**." It involves much work and little learning—and often lots of padding. Students seldom learn from our feedback, since the course is over before they get it—*if* they come by to pick up their papers. It's more productive to use several shorter essays.
- Build in **drafting and revising**. Even in non-writing courses, try these stages:
  - Þ **Pre-draft exploratory writing** related to the topic of the paper: freewriting done in class or a think piece done for homework. As students do this writing, there's no need for them to know they are setting out to write a high stakes essay.

Þ **Solid** or **midprocess draft** based on an explicit assignment: their best thinking so far. This is for sharing with classmates and feedback from you. (See below about feedback.)

Þ **Final draft.** It asks for substantive revision, *but* spelling and grammar don't yet matter. Students need to learn the difference between revising and editing. This version is graded.

Þ **Supplementary publication version—edited**. The only task is to get surface mechanics right. Help is allowed.* It's due a class or two after the final draft—and just needs half a minute to see if the copy-editing seems successful. The grade doesn't count unless or until it is successful

Responding without ruining our lives

- **On medium stakes think pieces.** Just a **check** or **check-plus**—along with straight lines in the margin where it's strong and wavy lines where it's problematic.
- **On high stakes essays.** Devote most of your available response time to feedback on midprocess drafts. Response at this draft stage helps them *improve* their paper—instead of just being an autopsy. When final drafts come in (or supplementary publication drafts), you can move quickly and respond by just making checks on a grid (see handout). Then just collect "final publication drafts" on the next class and glance quickly to see if copy editing is successful.

Grading. It's quicker and easier—*and more valid!*—to use fewer levels of quality. Fewer distinctions means fewer wrong calls and fewer student complaints about small distinctions. Four levels are enough for high stakes essays (e.g., **unsatisfactory, weak, good, excellent**). It's perfectly reasonable to derive conventional course grades (**A** through **F**) from a series of these four-step grades (along with other factors like attendance, meeting deadlines, progress, &c.).

Better yet, devise a **contract** for grading (see handout).

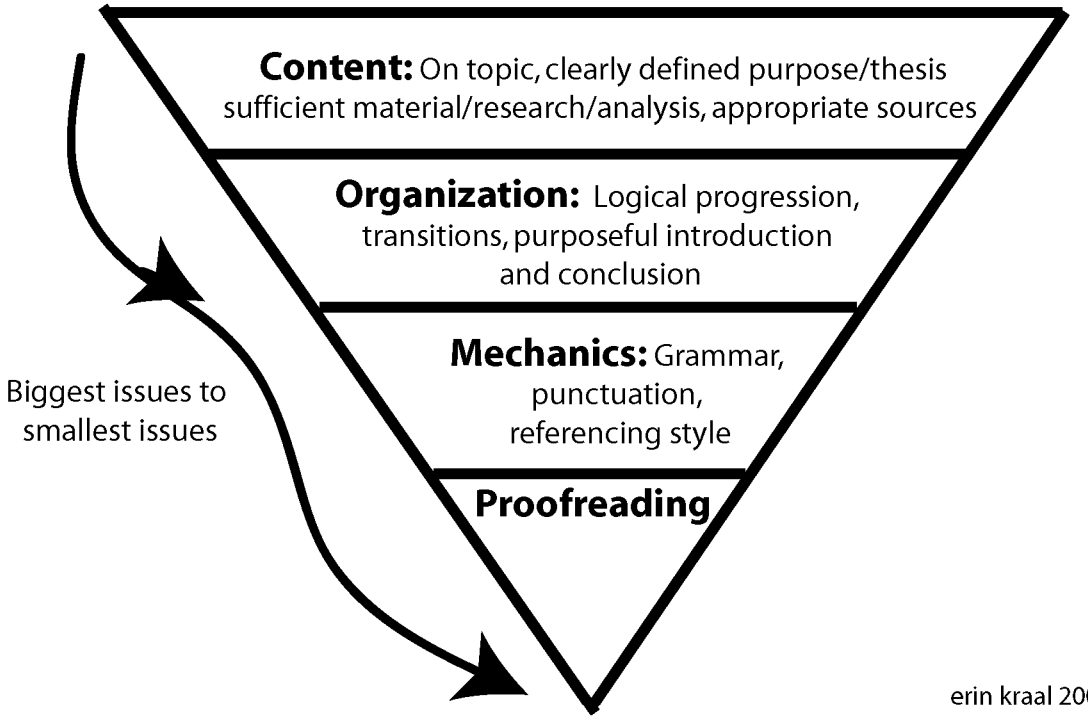
Peer response. Peer response is good (see my *Sharing and Responding*), but it is difficult and takes lots of class time. I'd use it sparingly unless you are actually teaching writing. Instead emphasize **peer sharing:** they read to each other and either (a) just listen and respond only with "Thank you"; or (b) discuss the ideas that came up—but not the quality of the writing. You may not realize how much learning comes from this process of just reading their own writing aloud and listening to the writing of others. We get powerful feedback on our language and thinking through the organs of **mouth** and **ear.** The process is enjoyable and takes little class time.

A Note About Plagiarism. When stakes are high, students will be tempted to plagiarize. Best to *prevent* it with techniques like these: (1) Collect lots of low stakes informal writing so students know that you know their style or voice. (2) On high stakes essays, assign very specific, idiosyncratic topics. (E.g., *"Apply this theory to that set of particular data." "Describe your reactions to X and then go on to . . . ." "Give a sympathetic summary and then a critical summary of what X------ writes on p 134, and then write an essay of your own reflections about it." "Write a short story that illustrates the principles we've studied this week."*) (3) Require drafts and revisions (and cover letters that explain their revisions). (4) If it's a large course with different section leaders, have those leaders make up different assignments for think-pieces and essays—so students are less tempted to share work between sections.

----

*It's not feasible to require that all our students be able to get rid of all mistakes without help; what they need to learn is how to get they help they need for a publication draft that is "virtually free from errors." Do not most of us get help in copy editing before we submit writing to a high stakes audience?

Revising Pyramid



erin kraal 2004

Specific Uses and Benefits of Low Stakes Writing

Peter Elbow

Low Stakes Writing In Class:

- 5-10 minutes of writing at the start of class to help students bring to mind their homework reading or lab work or previous lectures.
- 5-10 minutes in mid class when things go dead--or to get students to think about an important question that has come up.
- 5-10 minutes at the end of class or lecture to get them to think about what's been discussed.
- 5 minutes at the end of class to write *to us* about what they learned that day: what was the main idea for them? what was going on for them during that class? This helps them integrate what they've heard, and if we collect it, we learn what's getting through and what isn't.

If I have students in a new class who will resist the idea of writing that I don't collect, I start off collecting it for a few sessions, but I stress that I won't grade or comment; I'll just check to make sure they used the writing to explore the topic. Sometimes I take a few more moments to have students read these pieces aloud to a partner or small group. This way, I can teach them that it's not a waste of time write in a low stakes exploratory way. After a few sessions like this, I can stop collecting and let these pieces be entirely private--or just for sharing with others. Students learn and I don't have to read.

Low Stakes Writing Out of Class:

Many teachers require students to keep a journal of informal and probably personal reflections to readings and classes. The goal is to get students to connect what they are studying with the rest of their experience, thoughts, and feelings. Some teachers read journals; others treat them as private and just check that students are writing. It can be productive to get students to trade journals weekly with a peer--perhaps for a response, perhaps not. Some students have a hard time connecting with journal writing; they feel it's useless and artificial—especially if no one else reads it. Teachers sometimes ask instead for a weekly *letter* to a classmate or friend in which they reflect on the course material.

Benefits of Low Stakes Writing

1. To help students stay involved in the course. Regular low stakes assignments get students to keep up with the assigned reading every week. When students put off the reading till exams or major papers, they learn less from discussions and lectures—and class goes dead.

2. To improve students' high stakes writing. In their high stakes writing, they often struggle in nonproductive ways and produce terrible and tangled prose. Their low stakes writing is usually livelier, clearer, and more interesting--in spite of any carelessness and mistakes. I've almost never seen a piece of low stakes writing I couldn't easily understand, but I've seen lots of high stakes writing that students have worked very hard on--and found it impenetrable.

3. To help our commenting. With frequent low stakes pieces, we don't have to grade or comment on any writing till they are already warmed up and fluent. And when we've already *seen* a number of their low stakes pieces, we don't have to panic when they turn in a high stakes essay that is tangled or impenetrable. We can just say, "Come on. You can write all this in the clear lively voice I've already seen you using."

4. To help students be active learners, not passive receivers. It helps students involve themselves in the ideas and subject matter of the course. During a lecture or discussion, there are usually only a minority of minds in the room that are active. During low stakes writing, virtually all minds are actively processing the ideas of the course.

5. To help students find their own language for the issues of the course: their own analogies and metaphors for academic concepts. Learning a discipline means learning its discourse, but it also means learning *not* to use that discourse. Students don't really know a field until they can write and talk about the material in their *own* lingo--in their informal, "home" or "personal" language that is saturated with experience.

6. To help students be more adventuresome and questioning. When students write for a grade, they tend to play it safe—making large generalizations and running away from what they are not sure of. Low stakes writing leads them to explore perplexity—something they need not only for the sake of learning but for the sake of greater conceptual depth in their finished essays.

7. To help us understand how our students are learning. Low stakes writing gives us a better view of how students are understanding the course material and reacting to our teaching—how their minds are working. We can see interactions between their thinking and their feelings—and how course material relates to other realms of their life.

8. To help students learn to write with full attention to their thinking. Many students have never experienced writing with *full attention* to their thoughts. Their writing has always been for a grade, and much of their attention has gone to worries about mistakes in language, spelling, or wording.

9. To help students learn meta-cognitive thinking. There's a special application of low stakes writing to math and science courses—and to problem solving in general: asking students to write the story of the steps their minds went through as they tried to solve a problem. It helps their thinking for students to share these meta-cognitive stories.

10. To help students learn to talk to themselves. It's a prime mark of wise and educated persons to be able to pursue a train of thinking inside their own heads—with no one else to talk to. Private low stakes writing helps students learn this valuable skill.

11. And don't forget: low stakes writing takes little of our time and expertise. We can require it but not grade it. We can read it but not comment on it. In many cases we don't even need to read it. Yet we can get students to read each other's informal pieces--and (if we want) discuss them.

From "High Stakes and Low Stakes in Assigning and Responding to Writing" by Peter Elbow. In *Assigning and Responding to Writing in the Disciplines*, edited by Mary Deane Sorcinelli and Peter Elbow, San Francisco: Jossey-Bass, 1997.

Freewriting Guidelines

By Dr. Erin Kraal

The idea behind free writing is that your ideas flow quickly and unedited from your mind onto the page.

Peter Elbow (the 'grandfather' of writing education) argues strongly for the importance of 'freewriting.' He defines freewriting in his book Everyone Can Write in the following way:

> *Freewriting means*
> - *not showing your words to anyone else (unless you change your mind later);*
> - *not having to stay on one topic – that is, freely digressing;*
> - *not thinking about spelling, grammar, and mechanics;*
> - *not worrying about how good the writing is-even whether it makes sense or is understandable (even to oneself).*
>
> *One constant remains however…having to put words on paper and indeed put them down without stopping.*

In freewriting you do not edit or revise your work. You do not worry about spelling, correcting your grammar, or deciding on punctuation. You do not erase in freewriting. If you want, you can draw a single line though something, but do not erase it. You need to write the entire time you have set aside. Pausing to think for extended periods is not the purpose of freewriting, getting your thoughts on paper is the purpose. During free writing it is perfectly fine to re-phrase something or try writing it different ways. You can change your mind on what you think. You can be uncertain. You do not need to (but may if you want to) formally 'conclude' your writing. All you need to do is simply write constantly for a set period of time. If you get stuck, keep writing even if it is things like, 'I'm not sure what to say now' or 'I feel stuck.'

Elbow identifies four beneficial aspects of freewriting. First, that it 'gets you going' when you are stuck. Being free to blabber on the page without worrying about all the other things starts the process of writing when you have a difficult topic or assignment. Second, freewriting improves thinking by encouraging us to dialog with ourselves, where we can question uncertainties and identify inconsistencies. Third, when writing absent from the constraints of an assignment, we begin to find our voice in written words. We learn to speak on the page with energy and presence. He finds the fourth and final benefit the most subtle, but the most important. We begin to think of ourselves as writers when we write more. We are allowed to explore a place where we are a writer, because we are doing it.

I find that free writing works best when you turn off your cell phone and use pen/pencil and paper not a computer. It also helps to let go a little bit and let your mind wander to places of creativity. You don't have to pour out your secrets like a diary, just let your thoughts flow on the topic at hand and see where they take you. Try writing in different styles, different ways. There are no penalties for trying something out.

I recommend that you set aside ~20 minutes for each session. Read the 'inspiration' through twice and examine the photograph/image/movie (if applicable), give yourself a few minutes to think about the prompt and then begin writing. Start by setting a timer for 10 minutes. Try to work your way up to 15 or 20 minutes. At first it may seem like a long time to write without stopping. It will likely feel awkward at first. That is fine. Some prompts or days it may feel easier to write for longer. That is fine, too. But each time write constantly for no less than 10 minutes. Try to do one a day or every other day to build up your skills. Personally, I like to keep my writing in an old lab-style notebook, but you can write on a stack of cocktail napkins if you like!

A few words about the 'inspirations'
It can be daunting to stare at a blank page and think, 'I've got to fill this for 10 minutes! I'll just check my facebook instead.' So I have put together a suite of free writing 'inspirations' related to geology (in some way) to help provide a starting point. The objective of these inspirations is to do just that: 'inspire' some thoughts. You do not have to write a formal essay or abstract or treat it like an assignment (in fact, you only need to follow the guidelines on free writing above, which explicitly state that you can digress whenever you want). The 'inspirations' are also not meant to be picked and chosen from…if you read one that seems difficult, or uninspiring, write anyway. Sometimes we have to write about something we don't really understand, don't like, or don't find inspiring. That is one purpose of freewriting.

A few words about 'respond to this prompt'
Some of the inspirations suggest a question for you to write about. But many of the inspirations will simply ask you to 'respond to' them. You can respond doing things like summarizing, relating it to an experience in your life/class/book, comparing it to something else you know, agreeing or disagreeing, expressing confusion or uncertainty about the meaning, connecting it to a previous writing, course subject or prior knowledge, etc.

Examples of freewriting prompts:
These prompts were used as a part of a surface process course and were used in a variety of ways. Some were emailed during the week while others were part of class or lab exercises. Yet others were used to re-enforce the major writing assignment in the class. Students kept a freewriting journal that was assessed for completion only (ie – if they wrote about a page for each prompt, then they received full credit, I did not read every entry) at the mid-term and final.

Number	Date	Inspiration
1	Jan 27	What do you hope to get out of this course? What are your concerns about this course? (in class)
2	Jan 28	In class yesterday I told you that whenever something depends on a rate of change, either spatial or temporal, a differential equation is sure to follow. Write about rates of change in science. Where are there important rates of change? Have you worked with rates of change in other classes or your research? How?
3	Jan 30	Take a look at these two videos of timelapse photography of glacial flow. Discuss your observations and thoughts in your writing. Mont Blanc Glacier Time Lapse http://www.youtube.com/watch?v=89sOW-FzoII Timelapse of Columbia Glacier in Alaska http://www.youtube.com/watch?v=g4kha1RY-LM
4	Feb 2	The principle of conservation has wide ranging applications and examples in the physical and natural sciences. Discuss the 'law of conservation' and how it applies to different circumstances and where it breaks down/does not apply.(in class)
5	Feb 3	18-Mile Crack Seen by NASA in Antarctic Glacier http://news.yahoo.com/18-mile-crack-seen-nasa-antarctic-glacier-205345573--abc-news.html I couldn't resist this article - check out the image and read the article. Given the experiments yesterday and what you know about glaciers respond to this article and image.
6	Feb 5	The principle of conservation has wide ranging applications and examples in the physical and natural sciences. Discuss the 'law of conservation' and how it applies to different circumstances and where it breaks down/does not apply. (in class)
7	Feb 8	Projecting into the Future: Where do you feel like your writing is the strongest? Where do you feel like your writing needs the most work? What kind of writing do you think you'll be doing in the future?
8	Feb 10	Yesterday you experienced something similar to field work...you had a plan, collected some data. Some things worked, some things didn't. You saw some things you didn't expect. You measured some things you didn't need to. You observed things you didn't measure. In field work, you'd work your data up at night and head back out again. What did you learn? How did your data collection go? What would you do differently if you had to 'head back out again' to another day of field work?
9	Feb 14	Check out this GUI on the scale of our world (biggest to smallest). After exploring this graphic, respond in your writing to either this representation of data, the importance of scale, or how scale is important science/life. http://abcnews.go.com/Technology/page/scale-universe-cary-michael-huang-california-high-school-15573968

10	Feb 22	View the image and caption below: http://epod.usra.edu/blog/2012/01/perito-moreno-glacier.html Respond to the different morphology seen in the glacier, compare it to the experiments, discuss the landforms, shape, etc that you see in the image.
11	Feb 28	In honor of our new objective to learn about numerical modeling: It's official: Physics is Hard…"It turns out that one of the most common goals in physics—finding an equation that describes how a system changes over time—is defined as "hard" by computer theory." Read the short article here: http://news.sciencemag.org/sciencenow/2012/02/its-official-physics-is-hard.html?ref=em And respond in your writing.
12	Mar 1	Eventually in graduate school or in the workplace, you'll be in charge of field teams (graduate students often supervise undergraduates, work site as the on staff geologist you'll often be in charge of the survey crew). What did you learn about surveying, being in charge of a team, organizing field work/crews?
13	Mar 8	Water is the driver of Nature. Leonardo da Vinci
14	Mar 23	What were your impressions from our field trip to Big Spring? What did you learn? What questions are you left with?
15	April 2	Mary Bridget asked about the Big Spring public education component – and there wasn't really a public education plan. What did you think of this? What ideas do you have for public education related to this type of project?
16	April 5	Plan for your paper…what is your next step? (in class response to editing workshop)
17	April 6	Nothing is softer or more flexible than water, yet nothing can resist it. Lao Tzu, Toa Te Ching
18	April 12	Elevator speech – Following the presentation by the professional geologists…what is your elevator speech? How would you introduce yourself?
19	April 17	Write about the audience for your paper. Who are they? Why are they important? Why did you choose to write to them? What challenges are there in writing to this group of people? (in class)
20	April 23	Take a moment to look through these images of the White Sands National Monument. http://www.nps.gov/whsa/photosmultimedia/duneimages.htm and this video (touristy – but cool images) http://www.youtube.com/watch?v=qERJW5mu4YE Reflect on White Sands Dunes, what these images tell you about. How it relates to the Jerlomack paper we read about White Sands. How the features relate to sedimentary processes you've learned about in the past.

The following assignment is used in a large, non-majors general education course called 'mission to the planets.' The assignment is ~5-10% of the students grade (depending on the year). All assignments are turned in via an online course management system. The are not revised, though I do approve their topics and sources (see attached handouts). The 'writing' is assessed by listening to the recorded podcast while checking through turn-it-in that the writing is original.

Students report this as one of their favorite assignments in the class. Typical responses to 'how would you improve this assignment' include:
"I thought it made us be adventurous and was a great project."
" The assignment was very useful. I like that you allowed Education Majors to create the podcast for student use. I think this project is definitely something I could use in the classroom."
Most common request is for a longer podcast time limit to cover more material.

The students do not view this as 'writing' and are general most concerned about recording a podcast for the first time. I demo this for them during a lab period. I play two example podcasts (the best ones I have) to model the podcast for them. I cancel lab the week the assignment is due to allow for additional office hours, meeting times, and grading time.

Grading takes ~4 min per podcast assuming the course management system is loading documents quickly (which it doesn't).

Scientific podcast

One component of this course is to communicate scientific ideas. In order to practice this and to prepare for the Mission Project at the end of the semester, you make ~2 minute podcasts on a topic related to planetary science and/or our Solar System.

In class you will learn how to make a podcast. In order to prepare for this exercise, you need to select a topic and do some preliminary research.

Assignment:
This assignment has three parts

- Prelab assignment (attached) – this counts as your Lab grade for March 5-7
- ~2 minute audio podcast (.mp3, WAV, WMA – the file must play on university maintained computers) put into the D2L drop box
- Summary sheet (available on D2L as a form) to be filed out electronically and turned in to the D2L drop box including a copy of your script. FYI – All scripts will be sent automatically to 'turn-it-in' to check for plagerism. This file MUST be compatible with D2L – (MS Word, WordPerfect, PostScript, Acrobat PDF, HTML, RTF, Plain Text) – no exceptions. If you do not have any of these applications on your computer, set aside time to use a university computer lab.

There is no assigned lab the week 7 (March 5 – 7th). This time is set aside for you to research, write and record your podcast. I will be available in my office during all standard lab times for individual help related to your podcast. The pre-assignment sheet (due Feb 29th) will be assessed for your lab grade for week 7.

Deadlines:
Feb 29th: Bring 1 turn of the completed pre-assignment. (note this must be APPROVED by Dr. Kraal before it can be turned in.)
Thursday March 8th, 5pm: Podcast and information sheet due in the D2L dropbox.

Podcast:
You must select a focused subject related to this course (Planetary science, NASA Missions, Solar System) for a ~2 minute audio podcast. Podcasts over 3 minutes or under 1 minute will not be graded. A list of *possible* topics is attached. There are to be 'jumping off' points for you. Pick something that relates to your and/or you think would be interesting to your fellow classmates.

You must have your topic signed off on by Dr. Kraal. You cannot proceed with your topic until your pre-assignment is signed by Dr. Kraal. You may do this in lab, during office hours, or before class.

This is a SHORT podcast, so your topic needs to be very focused. If you pick something like the history of rockets, it is too broad and there have been whole BOOKS written on the topic. You need to have a very specific, narrow topic for a successful podcast. A good example of these types of short podcasts is the program called 'Star Date.'
http://stardate.org/
You can use the search feature in the upper left corner to search for different topics. Stardate focuses on astronomy, but it also covers planetary science. You can get a sense of how much material you can cover in about 2 minutes.

Research:

The internet is a good place to research topics. However, planetary science is an area filled with lots of pseudoscience (in other words FAKE science). To make sure that you are getting valid information, you need to be very vigilant about making sure you have a valid source. Here are some guidelines:

- Try using google scholar (http://scholar.google.com/) - this limits your searches to academic and professional sources that have been partially 'vetted'
- Investigate who is sponsoring this website – if it is sponsored by something like NASA, a major University, the National Science Foundation, etc there is a good chance it has valid information. However, if it is sponsored by the 'Society of People who think aliens run the government' you are probably going to get biased information.
- Wikipedia – for the most part, Wikipedia is a good source for information about missions, planets, people. But it is your responsibility to check the information through other sources (like how it is referenced).
- Last updated – as you know, websites quickly grow outdated, especially in a field that changes as quickly as planetary science, so make sure you look at the 'last updated' section.
- Multiple sources – you should be able to check major facts in more than one location.

Another great way to research is to use some of the general science magazines like National Geographic, Sky and Telescope, Discovery Magazine, Scientific American, and Popular Science. Our library has online subscriptions to many of these magazines so you can search for your topic there as well.

Other good websites include the NASA sponsored websites
http://www.nasa.gov/
The NASA website also has podcasts and vodcasts – though some are longer and different format than the one you will be making for this assignment.

Part of your grade is based on the quality of your references. Listing a general website (like NASA.gov or Wikipedia.org) is unacceptable and will receive no credit. You must have the full website, including title of the page.

A part of researching is referencing where you got your information. So keep track of where you got each piece of information. Personally, I keep a text document open and copy and paste out the information I need and then copy the website (or name of the article or link to the article). Then I can look back and see exactly where each piece of information came from.

Script
Once you have completed your research you will need to write a script for your podcast before you record it. One average, people speak about 100-120 words per minute. Your podcast will be between 2 minutes so you should be looking at something around 250 words. It's not many! Choose carefully. (for example, there are about 50 words in this paragraph!) This script may be run through turn-it-in. You may not plagiarize language from ANY website. All scripts will be checked through D2L's online originality report. Cheating/plagiarizing will be dealt with seriously per the syllabus.

Audience
In general, you should assume your audience is your fellow classmates and use that to direct your tone and level of detail. If you have an alternative audience, you must CLEARLY identify your audience and their level. For example, if you are a communications major and you would like to use this as an example of information for a nightly newscast, make that clear. Or if you are an education major, you must identify the level (kindergarten is different than high school!) and if your content is

very basic, then you must include a reference to the grade-level material or learning objective your podcast would support.

Summary Sheet
(available for download off of D2L – compressed and copied for your reference here:)

1. What is the topic of your podcast?

2. What is the purpose of your podcast and who is your audience (if you have a different audience than your classmates)?

3. Copy your script below. How many words are in your script?

4. List your references (2 required). If your podcast is inspired by an image or is about a work of art, please make sure to include a link here.

5. What do you feel like you learned from this assignment?

6. Do you have any suggestions for improving this assignment in the future?

Assessment:

Your podcast will be assessed on a scale of 1 – 5 on the following areas

Assignment details (on time, script attached, etc)
Content (accurate, original, level, focus)
Delivery (understandable, interesting, audience)
References (comply with requirements, quality)

Where 1 is unacceptable, 2 poor, 3 average, 4 good, 5 excellent.

Podcast Ideas:

- ➔ Writing
  - Science fiction or popular science book review
  - Profile of science fiction or popular science writer/author
  - Interplay between science fiction writing and scientific progress
- ➔ Politics/Government
  - Funding of NASA/missions
  - Role of politics in missions (like Apollo or current moon missions)
  - International collaboration on missions
  - Marketing of space – NASA missions, corporate partnerships
  - International space treaties, who 'owns' things in space, legal issues
- ➔ History
  - Rocket development
  - Interplay between military development and NASA
  - Profile of famous or important scientists/space leader (the more obscure the more interesting!)
  - How an specific discovery impacted human history
  - Topics within the History of Philosophy of science
- ➔ Specific missions / Objects in Space
  - Any of the current, past, or future missions
  - An image of something from our solar system as inspiration (be sure to include a link to or copy of the image)
  - Important discovery from a mission or about a planet
  - Event like an eclipse or comet that can be observed in the near future
- ➔ Fine Arts
  - Art, music, performance, film inspired by or of planetary science/Solar System
- ➔ Life in Space
  - Search for life/exobiology
  - Medical advances discovered from space exploration
- ➔ Education and outreach (especially for this section be sure to clearly define your audience so that you can be assessed properly).
  - Modify a topic for a specific grade level or range (be sure to clearly define your audience in your assignment)
  - Relate a topic to a required learning outcome
  - Profile current/previous outreach or education efforts related to NASA/Solar System as resources for current teachers
- ➔ Other?
  - Do you have something else? Something that interests you? If you are not sure if it would qualify, send an email to Dr. Kraal with your proposed topic and a website/reference about it.

You may NOT use the following topics without complete and thorough justification – training and selection of astronauts, profiles of specific astronauts, any thing about horoscopes/astrology

Pre-Assignment NAME:
(counts for Week 7 grade) Lab Day: M / T / W

Due Feb 29th by 3pm (before class).

1. Go to the stardate.org website and listen to several podcasts. Search for general topics that interest you using the search function.
List the name and airdate of two podcasts that you found most interesting.

2. What is the topic that you have selected for your podcast?

3. Why did you select this topic?

4. What do you hope people listening to your podcast will learn?

5. What are three different sources that you have used to begin to research this topic? (general websites like nasa.gov or Wikipedia.com are NOT acceptable and will be returned.)

Dr. Kraal initial indicate she has approved of the topic _____

Example student podcasts (scripts only)

EXAMPLE 1:
Greetings, I am STUDENT NAME and this podcast is about the first dog in space. Contrary to popular belief the first female in space was not Valentina Tereshkova, it was a female Husky mix dog by the name of Laika. About a month after the Soviet Union sent Sputnik 1 into orbit they sent up Sputnik 2 on November 3rd 1957 with Laika strapped in the captain's seat. Sputnik 2 was designed and built in less than four weeks in order for the Soviet Union to achieve the lead in the race of space exploration against the United States. Scientists chose to use a dog for this mission because they thought out of all the animals, dogs, were able to handle long periods of sitting still. They collected Laika from the streets of Moscow with a handful of other stray dogs for this project. Female dogs were used specifically because they do not need to stand to urinate. The dogs were trained for inactivity by keeping them in small cages, around the same size of the space capsule, for 15 to 20 days. The actual capsule was equipped with fans to regulate the temperature and carbon dioxide absorbers to keep the air supply fresh. Food for Laika was in jelly form and placed in front of her to eat during the mission. She was chained in the capsule so she would stay facing forward. They placed a radio frequency tracking device into the capsule for communication purposes so Laika would be able to transmit "beeps" back down to earth. Original reports stated that Laika survived four days in orbit during her mission aboard Sputnik 2. Unfortunately, this statement was false. Laika only survived a couple of hours after takeoff and died due to panic and overheating. During the launch when the 1,120 pound capsule reached 18,000 miles per hour Laika's pulse jumped to three times its normal rate causing her extreme anxiety. The ship itself caught fire on April 14th 1958 diminishing in the solar system after lasting 162 days in orbit. Although Laika's existence was short lived, this Muttnik's influence impacted the advancement of space science and she will always be remembered as a hero.

EXAMPLE 2:
Student is an education major and chose an alternate audience and noted it here:
This podcast was designed for a 4th-6th grade science class. This podcast would just be one of many podcasts about the planets. I would have stations set up for each planet and students would be able to rotate around the stations to hear about the different planets.

Welcome to station two, on your mission to the planets.
How was your trip? You have traveled 31 million miles since you visited Mercury. You have now reached Earth's sister planet, Venus. Venus is the second planet from the sun, sitting between Mercury and Earth. To the viewers on Earth, Venus is brightest before sunrise or just after sunset. Because of this, for centuries Venus has been known as the Morning Star and the Evening star. In ancient times people thought that this bright planet, they saw in the morning and at night ,was two different stars! So why is Venus called Earth's sister planet? The answer to this question is that Venus is almost the same size as Earth. Venus is made up of many of the same materials as Earth. Also Venus has about the same gravity and density. Hey you haven't moved since we reached Venus, come on lets walk around and explore this planet some more. As we start to walk around don't you feel lighter on your feet? Thats because Venus has a little less gravity than Earth. For example if you were 100 pounds on Earth, now you are only 90 pounds. What do you notice about the ground here on Venus? That's right! It is very dry like a desert! See those huge mountains over there? Those are volcanoes. In fact we believe that Venus has more volcanos than any other planet in our solar system! Venus' volcanos are a little different than the ones on Earth though. The Volcanos here don't erupt. Instead, they slowly overflow and release lava onto the surface. Phew! Isn't it getting hot? The temperature on Venus can actually reach 900 degrees Fahrenheit! You see,those fast moving clouds up there trap the heat in. Airplane travel would actually be impossible on this planet because the wind up there travels over 200 miles per hour! Did you know that Venus's day is more than 100 Earth days! On the other hand, its year is only 225 Earth days. Look up at the sky. Do you notice something funny about this sunset? On venus the sun sets in the West, and rises in the East, because it spins backwards. And where is the moon? Oh yea i almost forgot, Venus doesn't have a moon! Come on, we better get you back on your space ship, for the long ride to your next destination. I would hate to see you get stuck in space traffic. Have a safe trip!

Please move to station 3- Planet Earth

GEL 346 Sedimentology and Stratigraphy
Field Trip: Putting it All Together: Clastic Depositional Environments and Change Through Time

Introduction

Over the next two weeks, you will examine Mississippian and Pennsylvanian-aged strata exposed along PA-61 outside of Pottsville, PA. Courtesy of PA-61, the exposure here is good but BE CAREFUL of the traffic zipping by behind you. Due to the dipping strata, rocks that are out of reach in one location come into reach further up the section so no climbing is necessary. Work through the outcrop systematically and take careful notes, we will be here twice, but our total time on outcrop won't be much more than two hours.

You will use your observations from this outcrop to:

- Produce detailed lithologic descriptions
- Produce a detailed stratigraphic column
- Make depositional environmental analyses
- Analyze change through time in both depositional environment and sedimentary basin characteristics
- Present your above findings and interpretations in:
    - An extended abstract.
    - A detailed stratigraphic column.

To this end, collect as much, and as detailed information as you can about the thickness of beds, laminae, and the section as a whole, as well as information on the lithology, sedimentary structures, etc. contained in each bed. When in doubt, collect MORE rather than LESS information.

In the field

- Use a Jacob Staff to measure the indicated thickness of outcrop. If necessary, use a ruler to accurately measure the thickness of finer beds or laminae.

- For each bed that you identify, collect detailed lithologic information as well as structural or textural observations that will aid you in determining the likely depositional environment(s) of these strata.

For the stratigraphic column

- The scale of your column should be 1m = 2cm.
- Your column should cover the entire thickness you sampled, if there are covered intervals in your section, indicate the covered interval at an appropriate (to scale) thickness.
- Your column should contain descriptions of the rocks you observed, including any special structures or textures.
- Your column should contain interpretations (i.e. depositional environments) for each bed that you observed.

- Refer to your handout from the beginning of the semester for further details on constructing stratigraphic columns.

For the extended abstract

- Follow the instructions in your Geowriting handout and what you have learned from previous writing assignments.
    - You are limited to **2 pages** in a **type face no smaller than 12 point** with **margins no smaller than 1" all around**.
    - You may include references. The reference list should be at the end of your abstract and **counts in your 2 pages**. The reference list may be in **10 point font.**
    - You may refer to figures and data tables. Your figures and data tables should be attached and **do NOT count** towards your 2 pages.
- Make sure that your abstract has an appropriate introduction that sets the stage for your reader with information on location, setting, and topics that will be presented/addressed in the abstract.
- Make sure your methods are detailed enough to be reproduced by other researchers but don't consume too much of the text.
- Make sure that you organize and clearly present your results.
- Make sure to present ALL your data – if you think some observations are suspect, you can address this in your discussion and interpretations.
- Make sure that your Abstract includes not only the information you gathered (section thickness, lithologic descriptions etc.) but also the information you created (interpretations of each bed, overall interpretation of multiple beds/entire outcrop).
- Make sure that you clearly support your interpretations with the information that you observed in the field.
- Make sure to connect your depositional environment(s) to a time-transgressive interpretation of changes in immediate environment as well as evolution of the sedimentary basin as a whole.

There **WILL BE** a revise and resubmit on this assignment.

Your first draft is **DUE November 21.**

The final draft is **DUE December 14 in the Final Exam Period (11:00).**

This assignment will now be counted in Category III of the grading scheme.

Pottsville Extended Abstract Grading Rubric

Stratigraphic Columns (24 pts total)

- Lithology Column (**12pts**)
  - Scaled as requested (3pts)
  - Scale indicated on columns (3pts)
  - Unit width a reflection of grain size (3pts)
  - Appropriate lithologic symbols (3pts)
- Description Column (**9pts**)
  - Lithologic descriptions (3pts)
  - Rock Name (3pts)
  - Structures/Textures (3pts)
- Interpretation Column (**3pts**)
  - Depositional environment/facies of each bed. (3pts)

Extended Abstract (**76 pts total**)

- Science (**41 pts**)
  - Lithologic Descriptions (8pts)
  - Depositional environment for each bed (8pts)
  - Changes in depositional environment through time (8pts)
  - Evolution of the sedimentary basin through time (8pts)
  - Clear connections between data, bed interpretations, environmental change through time, and basin evolution (8pts)
- Writing (**35 pts**)
  - Key elements of the abstract:
    - Description of the problem (what is it, why is it important) (**5 pt**)
    - Methods (reproducible, complete) (**5 pt**)
    - Data/observations (**5 pt**)
    - Implications (what are the conclusions and how do they relate to the original problem) (**5 pt**)
  - Length (**5 pt**)
  - Grammar (**10 pt**)