Science Communication

Syllabus for ADVS 6650/5650

abby d. benninghoff, ph.d.

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Department of Animal, Dairy and Veterinary Sciences
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If you wish to adapt this curriculum at your institution, please contact Dr. Benninghoff via email at abby.benninghoff@usu.edu
ADVS 5650/6650:
Science Communication

Instructor
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Course Information
ADVS 5650/6650: Science Communication
Fall 2018, Tues/Thurs 1:30 to 2:45 pm
Location: AGRS 141
Course credit: 3 credit hours

Course Description
Science Communication is the sum of all those processes by which scientific culture and knowledge is incorporated into
the common culture. In this course, students shall be informed on the best practices for science communication intended
for a variety of audiences, including immediate peers in the field, other scientists in related fields, media representatives
and public audiences. A central focus of the class will be on effective communication methods, both verbal and visual. An
iterative write/review/resubmit approach will be employed so that students can utilize constructive instructor and peer
criticism to improve their communication skills. This course is not discipline-specific, but rather intended for any student in
the sciences, either in a research, extension or teaching capacity.

Why Science Communication?

"Not everyone wants to write for a general audience and not everyone can do it well. But clearly, there is a place
in the academy for those who can. From a college's point of view, it is important to disseminate faculty research
broadly. Many grantmaking agencies depend to a degree on public support for research, which means that telling
the public about your professors' useful research makes it more likely that your institution will get grants. Public
support increases legislators' enthusiasm for public institutions, too.

If we take an even broader perspective, we see that as scholars, we also owe an explanation - one that just about
anyone can understand - to a wide audience. If the purpose of academic knowledge is to contribute to human
knowledge, presumably for the greater good, then that research should be accessible to everyone.

— Meredith E. Small "Owing a Written Explanation to the Widest Possible Audience," The Chronicle of Higher
Education, 17 November 2000, B5.

Course Objectives
• Students will understand the historical conventions of science communication and their impact on the
organization, use and distribution of scientific knowledge
• Students will gain factual knowledge about the publication process, including preparation of a manuscript,
interaction with journal submission systems and editorial staff and the review process.
• Students will gain factual knowledge about the process of requesting funding for research, teaching or extension
projects and the process of grant review.
• Students will develop skills for communicating specialist knowledge to science peers and to non-specialist
audiences.
• Students will develop skills for science communication via oral and written presentations for technical and lay
audiences.
• Students will learn how to find and use resources for preparing science articles, proposals or public materials.
• Students will analyze and critically evaluate the role of science and scientists in local, national and global
community.
• Students will apply course material to improve thinking, problem solving and decisions through course activities,
including class discussions and oral and poster presentations.
Prerequisites
No prerequisites are required. Completion of ENGL 1010 and 2010 (or the equivalent) are strongly recommended.

Purpose of this syllabus
This syllabus is not a “contract” per se, but rather a set of course policies, objectives and proposed timeline of activities. This document outlines my intentions with respect to delivery of material and assessment of student performance. As the instructor, I reserve the right to make changes to this syllabus in order to more effectively and efficiently manage course activities. Please be aware that such changes are most often to the students’ benefit.

Course Resources

Infrastructure Canvas
Canvas is a Learning Management System which we will use for our course. You can login to Canvas at https://online.usu.edu/. Your username is your A#, and your password is your global password (the same one you use for Banner or Aggiemail). Student tutorials for using Canvas are available online at https://online.usu.edu/support/canvasStudent.cfm. You may expect to find on Canvas the syllabus, assignment descriptions, any supplemental reading materials and your posted grades. Feel free to use this system for group discussions outside of class, though communication to me would be best via regular email (see below).

Software
Documents in this course will be presented in .pdf format where possible. You will need Adobe Reader to view these files, which you can obtain for free at http://get.adobe.com/reader/. Written assignments may be prepared using Microsoft Word document (.docx), Microsoft PowerPoint (.pptx) or other comparable word processing or presentation software. If you do not have Word or PowerPoint installed on your computer, you may use Open Office Writer and Impress instead, which you can obtain for free at http://www.openoffice.org/. Endnote is a reference manager software package, available either online or as desktop software. We will discuss the use of Endnote in class, and if you are pursuing studies that will involve writing papers or manuscripts, this software would be highly useful for you and well worth the investment. Student pricing is available ($99). See http://www.endnote.com/ for more information.

Textbook(s)
The primary text recommended for this class is:

- Scientific Writing and Communication, Angelika H. Hofmann, 3rd edition 2016, Oxford University Press (older editions are also ok)
- I also suggest you look at the following text as an additional (free) resource: Writing for Science by Robert Goldbort, published by Yale University Press, ISBN #9780300117936; available via USU’s ebrary site at http://site.ebrary.com/lib/usulibraries/home.action using your A# and strong password. If this will be your first experience using the ebrary online book site, please review the orientation information provided under the “getting started” section.

Course Activities

Readings
The course schedule at the end of the syllabus indicates a schedule of recommended readings, which will be supplemented occasionally with additional materials and/or journal articles. Any additional materials will be provided to you on Canvas as a PDF document or as an accessible URL link. Unless indicated otherwise, you may consider these readings as useful background material.

Lecture topics (some lectures will cover more than one class period)
1. Introduction and objectives (yours and mine)
2. Why science communication?
3. Reading and writing well
4. The scoop on journal articles
5. Elements of a standard journal article
6. Rules of the road for graphics and formatting
7. Giving credit where credit is due – issues of references, plagiarism and authorship
8. Other types of science writing
9. Begging for $ - the art of the scientific proposal
10. Strategies for effective proposals – all about the aims
11. Other types of funding – focus on fellowships
12. The review process
13. Science & society; scientific integrity & pseudoscience
14. Preparing oral and poster presentations
15. Getting the job – CVs, cover letters and interviews

PowerPoint lectures will be posted on Canvas within 48 hours of presentation in class. The slides will be provided as a .pdf or .ppt file that can be viewed on your computer, downloaded and printed. Please note that lecture files listed online currently are draft and may be modified for the in class lecture. A final version of all presentations will be posted to Canvas shortly after the lecture. These slides should be used to supplement your in class lecture notes. Please review the USU Academic Resource Center Idea Sheet on effective note taking. 
https://www.usu.edu/asc/assistance/idea_sheets

Discussions

Most weeks, a discussion thread will be posted on the Canvas Discussion board relevant to the recent lecture topics. These discussions may include a sample article or recording for you to review and then provide your feedback. Participation in these discussions is expected, and each topic is worth 5 points. Note that to earn full points, your contribution should be substantial, not just a throw away comment, like “Yeah, I agree with that point.” Substantial responses would state your opinion and provide some context for your statement. Due dates for each discussion topic are shown in the Canvas calendar. 50 points in total are allocated for Discussions.

Major assignments

Submission of completed assignments (as Word documents, PowerPoint files or PDFs) should be made through Canvas, not via email to me. This course will not use quizzes or exams for assessment. There are 7 assignments for this course. On the Canvas link to “assignments”, you will find a detailed description of the assignment objectives, general guidelines for completion, grading, due dates and rubrics for evaluation. These details are not included in the syllabus – they must be reviewed online. Please see the instructor if you have questions about the assignment or need assistance uploading submissions. The table below lists the major assignments and their point totals. Note that some assignments have required draft versions and peer reviews. See Canvas for more details on each assignment.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Draft version</th>
<th>Peer review</th>
<th>Final version</th>
<th>Assignment total</th>
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</thead>
<tbody>
<tr>
<td>Discussions (5 pts each)</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>50</td>
</tr>
<tr>
<td>Science articles</td>
<td>10</td>
<td>10</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Designing data figures</td>
<td>na</td>
<td>na</td>
<td>25</td>
<td>25</td>
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<tr>
<td>Proposals</td>
<td>10</td>
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<tr>
<td>Seminar critique</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>25</td>
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<tr>
<td>Popular research</td>
<td>10</td>
<td>10</td>
<td>30</td>
<td>50</td>
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<tr>
<td>Poster presentations</td>
<td>10</td>
<td>15</td>
<td>50</td>
<td>75</td>
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<tr>
<td>Oral presentations</td>
<td>na</td>
<td>na</td>
<td>75</td>
<td>75</td>
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<tr>
<td>Special for Graduate Credit</td>
<td>na</td>
<td>na</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Total points</td>
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<td></td>
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<td>400</td>
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<tr>
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<th>5650</th>
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<tr>
<td>Total points</td>
<td>400</td>
<td>450</td>
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Students must prepare a large scale poster for presentation during the course final exam time slot as part of an end-of-term poster session. Cost of poster printing is the responsibility of the student; using the USU Publication and Design center, the estimated cost of printing is about $45.

Requirements for Graduate Students Registered for ADVS 6650

Students who register for this course for graduate level credit must fulfill additional requirements for course completion. Specifically, **graduate level students must complete one or more additional assignments of their choosing from the list above totaling at least 50 points.** For example, a student could prepare an additional poster presentation or write two additional seminar critiques. Or, one could write a second essay on proposals and another on science articles. Many combinations are possible. You are encouraged to select assignment(s) that will provide training suitable for your area of career emphasis. However, there won’t be any points for peer reviews or drafts (revisions aren’t an option for graduate credit assignments). Finally, because the assignment for graduate credit is due at the end of the semester, no revisions will be possible; thus, grades awarded to these assignments are final. The additional assignments will be due at the end of the semester, on **December 6 by 5pm** submitted in electronic form via Canvas. (Please note this is before the final exam date, necessary to help me finalize grades in a timely manner.) More details on this requirement for graduate students are available in Canvas.

Proposals for Alternative Assignments

This course is designed to be customizable for students with varied backgrounds, including both undergraduate and graduate students from departments in the College of Agriculture and Applied Sciences, the College of Science and other units on campus. Because of these diverse backgrounds and diverse needs, I am willing to occasionally approve alternative proposals for assignments. If you have a suggestion for an alternative to one of the course assignments, present this as a short written proposal at **least one week prior to the preliminary due date** (that is, the due date for first drafts). I shall judge your proposal as to whether it accomplishes the relevant course objectives, fits in the topic area of the original assignment and merits the point total of the original assignment. If you receive approval (within 24 hours), your alternative assignment will be due at the same time as the other assignments. Approval of alternative assignments is not guaranteed. Moreover, I doubt that I would approve many requests for alternatives from the same student. Thus, please review the assignments at the start of the term, pose questions to me about their content and purpose, and decide which (if any) you wish to modify.

Course Policies

**Open office hours**

I will have regularly scheduled open office hours for you to discuss the course materials or assignments. To meet at a different time, **you must contact me by email to schedule an appointment. Please do not simply drop by my office.** I would prefer to meet with you either during my designated office hours or at a scheduled appointment so that I may devote my undivided attention to your needs.

**Student Feedback/Communication**

I welcome all feedback on the course. My preferred method of communication with individual students is via email, as that feedback can be archived precisely. Please send your email via Canvas, as messages to my regular email are easily lost among other business. Generally, I will respond to email within two working days (Monday – Friday). Thus, if you have a question about an assignment due on Monday, then you should contact me by the prior Wednesday at the latest.

**Student attendance policy**

Because this course will involve extensive classroom discussion, your participation or lack thereof will factor into my evaluation. Please note that this will be a subjective evaluation, as is the prerogative of the instructor. While points will not be awarded for attendance, I may be inclined to adjust the final grade for a student with a high level of participation; for example, a student with an 86% average could be adjusted from a B to a B+ if he/she was very active in the course. Do not petition me to adjust grades; be assured that your final posted grade will reflect my judgment of your class
performance, including your participation. *One area in which you can demonstrate robust, active participation is via the course discussion threads.*

**Late Work**
All assignments in this course are mandatory. The due dates and times for each assignment are stated clearly on Canvas. To maintain fairness among all students in the course, **there will be no opportunity to submit late work** without a justifiable legitimate emergency. Late work due to legitimate emergency may be accepted.

If you experience a legitimate emergency that will prevent you from completing required coursework on time, I expect you to communicate with me at the earliest reasonable opportunity. Please state the nature of the emergency, and when you expect to complete the coursework.

Examples of **legitimate emergencies** or reasons for missing class include (but are not limited to):
- death or serious, emergent illness of immediate family member (e.g., parent, sibling, spouse or child)
- serious illness or injury to the student requiring medical care or hospitalization
- unexpected severe inclement weather generating very hazardous road conditions
- university-sanctioned educational events
- mandatory court appearance

Examples of **poor** excuses that would not constitute an emergency include (but are not limited to):
- being stopped for a traffic ticket on your way to campus
- a simple stuffy nose or cold (though please take care to practice good hygiene and sit at some distance from your classmates)
- you got stuck in the lab on an experiment (practice good time management)

Please remember: *An emergency on your part does not necessarily constitute an emergency on my part!*

**University Policies:**
**Honor Pledge**
Students will be held accountable to the Honor Pledge which they have agreed to: “I pledge, on my honor, to conduct myself with the foremost level of academic integrity.”

**Plagiarism**
Plagiarism will not be tolerated. Please review the following information on plagiarism.

- [http://www.plagiarism.org/plag_article_what_is_plagiarism.html](http://www.plagiarism.org/plag_article_what_is_plagiarism.html)
- [http://www.plagiarism.org/plag_article_educational_tips_on_plagiarism_prevention.html](http://www.plagiarism.org/plag_article_educational_tips_on_plagiarism_prevention.html)

**Academic Dishonesty**
The Instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University’s Student Code: ([http://www.usu.edu/studentservices/pdf/StudentCode.pdf](http://www.usu.edu/studentservices/pdf/StudentCode.pdf))

Acts of academic dishonesty include but are not limited to:
1. Cheating: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity, including working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done “individually”; (2) depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; (4) acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission; (5) continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity; (6) submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or (7) engaging in any form of research fraud.
2. Falsification: altering or fabricating any information or citation in an academic exercise or activity.
3. Plagiarism: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.
**Students with Disabilities**

Students with ADA-documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, (435)797-2444 voice, (435)797-0740 TTY, (435)797-2444 VP, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible if you wish to request an accommodation. Accommodations can only be made via the DRC.

**Course Evaluations**

Students will complete electronic evaluations provided by the IDEA center online. You can read more about the evaluation format here: [http://usu.edu/aaa/idea_faq.cfm](http://usu.edu/aaa/idea_faq.cfm). **Students are expected to complete the online evaluation for this class.** Course evaluations are critical for faculty to assess their success (or lack thereof) in effectively meeting the course objectives. Without student input, faculty cannot adequately determine their effectiveness or make appropriate adjustments to course content or teaching approaches to meet students’ needs.

**Grading**

Your grade will be based on the following components:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Draft version</th>
<th>Peer review</th>
<th>Final version</th>
<th>Assignment total</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>5650</td>
<td>6650</td>
<td>5650</td>
<td>6650</td>
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<tr>
<td>Discussions (5 pts each)</td>
<td>na</td>
<td>na</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Science articles</td>
<td>10</td>
<td>10</td>
<td>30</td>
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<tr>
<td>Designing data figures</td>
<td>na</td>
<td>na</td>
<td>25</td>
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</tr>
<tr>
<td>Proposals</td>
<td>10</td>
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<tr>
<td>Seminar critique</td>
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<td>Popular research</td>
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<td>na</td>
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<td>Special for Graduate Credit</td>
<td>na</td>
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Total points | 400 | 450 |

na = not applicable (no draft version or peer reviews for this assignment)

Your grade will be calculated using the following scale (averages rounded up/down to nearest whole number):

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
<th>5650 Points</th>
<th>6650 Points</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>93 - 100%</td>
<td>370 - 400</td>
<td>416 - 450</td>
</tr>
<tr>
<td>A-</td>
<td>90 - 92%</td>
<td>358 - 369</td>
<td>403 - 415</td>
</tr>
<tr>
<td>B+</td>
<td>87 - 89%</td>
<td>346 - 357</td>
<td>389 - 402</td>
</tr>
<tr>
<td>B</td>
<td>83 - 86%</td>
<td>330 - 345</td>
<td>371 - 388</td>
</tr>
<tr>
<td>B-</td>
<td>80 - 82%</td>
<td>318 - 329</td>
<td>358 - 370</td>
</tr>
<tr>
<td>C+</td>
<td>77 - 79%</td>
<td>306 - 317</td>
<td>344 - 357</td>
</tr>
<tr>
<td>C</td>
<td>73 - 76%</td>
<td>290 - 305</td>
<td>326 - 343</td>
</tr>
<tr>
<td>C-</td>
<td>70 - 72%</td>
<td>278 - 289</td>
<td>313 - 325</td>
</tr>
<tr>
<td>D+</td>
<td>67 - 69%</td>
<td>266 - 277</td>
<td>299 - 312</td>
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<tr>
<td>D</td>
<td>60 - 66%</td>
<td>238 - 265</td>
<td>268 - 298</td>
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<tr>
<td>F</td>
<td>0 - 59%</td>
<td>0 - 237</td>
<td>0 - 267</td>
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</table>
Designing Data Figures

Assignment objective

Students will recognize good data figure design and apply principles for effective data visualization, either by constructing graphs from supplied data sets or providing constructive critiques of example figures.

This assignment is linked to these course objectives:

- Students will gain factual knowledge about the publication process, including preparation of a manuscript, interaction with journal submission systems and editorial staff and the review process.
- Students will develop skills for communicating specialist knowledge to science peers and to non-specialist audiences.

Option 1. Critique figures

In this file Designing data figures - option 1.pdf you will find seven sample figures that I found in journal article publications and online. Your task is to use the information you learned in class on effective strategies for designing data figures, as well as your own judgment, to provide a critique on these samples. Identify the major problems and then advise the original designer on how he/she can improve their figure.

Option 2. Design your own figures using these available data sets.

In this file Designing figures - option 2.docx you will find three sample data sets. Your task is to design three data charts that accurately depict these data. You may use whatever graphing software you have available to you, but be sure to use the guidelines for preparing figures that we discussed in class to guide you.

Grading and due date

Upload a PDF file with your new figures or critiques of the figures provided to you. This assignment will not incorporate peer review. The assignment is due Sept 20. You have the option of submitting a revision after the instructor reviews the assignment.

<table>
<thead>
<tr>
<th>Assignment Element</th>
<th>Due date</th>
<th>Available points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final version</td>
<td>Sept 20</td>
<td>25</td>
</tr>
<tr>
<td>Revision (if you choose, not required)</td>
<td>Oct 4</td>
<td></td>
</tr>
</tbody>
</table>
Science Articles

Assignment objective

By exploring the changing nature of scientific publications or delving into the characteristics of modern scientific publications, students should become very familiar with this main method of communicating scientific research to peer audiences.

This assignment is linked to these course objectives:

- Students will understand the historical conventions of science communication and their impact on the organization, use and distribution of scientific knowledge
- Students will gain factual knowledge about the publication process, including preparation of a manuscript, interaction with journal submission systems and editorial staff and the review process
- Students will learn how to find and use resources for preparing science articles, proposals or public materials.

General instructions

The essay length should be 500 to 750 words. Please carefully review your prepared text for correct spelling, grammar and sentence structure. Always remember that a reader will have a more favorable view of your writing if you make it easy for them to read it.

Select from one of the following two assignment options.

Assignment option 1: Prepare an essay evaluating trends communication in science journals by comparing and contrasting a representative historical article (circa 1980-1990) to a contemporary report (2010-present) from a journal in your discipline. For example, some aspects to consider could include the difference in writing styles, formatting of tables and preparation of figures, and/or the instructions provided to authors. A number of journals have archived older articles online, though your selected journal may have older articles available only in hard copy. If the article you wish to review is not available here at USU, you may utilize the Inter-Library Loan request System (http://library.usu.edu/ill/index.php [Links to an external site.]) to get a digital copy of your desired article. However, you should plan ahead, as these requests may take some time to fulfill.

Assignment option 2: Select three seminal papers in the natural or physical sciences. Write a paper evaluating their “surface” characteristics (authorship, format, length, figures, etc.) as well their “depth” characteristics (use of language, relationship to literature in the field, relationship to intended audience, etc.). The goal of this assignment is to gain an understanding of the qualities of top science articles in modern publishing, both in terms of their structure and the style of writing. Good journal choices for identifying these types of articles include Science, Nature, Cell, the New England Journal of Medicine, PLoS Biology, FASEB Journal, Nature Chemistry, Journal of Biological Chemistry, Journal of the American Chemical Society, Ecology Letters and Nature Physics. Read the three papers carefully, and present a comparison/contrast essay on the characteristics described above. Again, if your desired article is not available online (often the most recent articles are embargoed for a year), utilize the ILL system to request your desired article (http://library.usu.edu/ill/index.php [Links to an external site.]).

Grading and due dates

Assessment of this assignment will be in two parts: 1) peer review from students and 2) final review by instructor. Students will use a Canvas rubric to evaluate their classmates (See page on Peer Evaluations).
• The draft of this assignment is due Sept. 27th via electronic submission to canvas. A draft version is required and will constitute 10 points (20%) toward your final grade.

• Peer reviews (each student must complete 3) are due October 4. Students should use the assignment rubric in Canvas to prepare their peer reviews. Peer review scores (average of top 2 scores of the 3 peer reviews) will constitute 10 points (20%) of the final grade. The peer review score will be manually calculated and entered as part of the point total for the draft assignment. Peer reviews are automatically assigned shortly after midnight in the early morning following the draft deadline. Failure to submit your draft on time automatically results in loss of 10 points. (It’s very difficult to sort out reviews after the assignments have been made.)

• Should you fail to complete your reviews for your assigned peers, 5 points for each missing peer review will be deducted from your point total.

• The final version of the assignment, which incorporates revisions inspired by comments from peers and the instructor, is due Oct 11th.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Draft</td>
<td>Sept. 27</td>
<td>10</td>
</tr>
<tr>
<td>Peer reviews (3 total; top 2 scores count)</td>
<td>Oct. 4</td>
<td>10</td>
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<tr>
<td>Final version</td>
<td>Oct. 11</td>
<td>30</td>
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<tr>
<td></td>
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<td>50 points total</td>
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</table>
Proposals

Assignment objective

Students will apply principles of good grantsmanship, as outlined in class, in the preparation of their own research proposal or through critical evaluation of provided example proposals.

This assignment is linked to these course objectives:

- Students will gain factual knowledge about the process of requesting funding for research, teaching or extension projects and the process of grant review.
- Students will develop skills for communicating specialist knowledge to science peers and to non-specialist audiences.
- Students will learn how to find and use resources for preparing science articles, proposals or public materials.

General instructions

The length of the proposal should be approximately 2000 words (about 6 double-spaced pages), while each critique should be about 500 to 700 words (1.5-2 pages), excluding references. Please carefully review your prepared text for correct spelling, grammar and sentence structure. Always remember that a reader will have a more favorable view of your writing if you make it easy for them to read it. An evaluation rubric for essays is provided below.

Select from one of the following three assignment options.

Students who already have begun preparing a proposal or who have a draft already written are advised to select option 1. Otherwise, students may find options 2 and 3 more suitable.

Assignment option 1: Prepare a research fellowship application to a funding agency related to your discipline (NSF, NIH, USDA, NASA, NOAA, etc.) following the criteria outlined in the fellowship guidelines. For this assignment, you should not complete application materials related to budget, CV, mentor, institution, etc. Rather, focus your writing entirely on the proposal text. Follow the guidelines for organization of the proposal content set forth by the funding agency, except with regard to length (should be 4-5 pages for this proposal). For example, an NIH fellowship grant may allow 10 pages for the proposal, which should include 1 page on specific aims, and 9 pages covering the background, significance and scientific approach. For this assignment, you may adjust the length of the latter three sections from 9 pages to 5 pages. (I would get in the habit of your aims or objectives section being one page in length.) The major sections to include in this proposal are (unless indicated otherwise by the funding agency): specific aims, background/introduction, research plan (which should include discussion of alternative approaches). References are also required, but are not to be included in the page count. Feel free to consult with your major advisor or a mentor in your field on the crafting of a hypothesis or experiment design, but the writing of this proposal should be yours. Do not simply extract information from proposals written by others in your laboratories. You should also include references to cited material as appropriate.

Assignment option 2: Identify non-profit organizations in your discipline area, and prepare a proposal requesting support for an educational or outreach program (or other training program) that you would like to develop for Utah. For this assignment, you should not complete application materials related to budget, CV, institution, etc. Rather, focus your writing entirely on the proposal text. Follow the guidelines for organization of the proposal content set forth by the funding agency, except with regard to length (should be 4-5 pages for this proposal). You may consult with a mentor or your advisor over the concept of the proposal, but the writing of the proposal should be yours. Include references to cited material as appropriate.
Assignment option 3: Prepare a detailed peer review of a grant proposal (examples to be provided) following the critique criteria outlined in the file guidelines for proposal review. A set of grant proposals has been uploaded to Canvas (see the module on proposal writing), from which you may select one to read and prepare a critical review. You may not find a grant in your specific area of expertise, and I will not expect you to be able to adequately critique the research strategy due to your lack of expertise. You should focus, rather, on the organization of the grant, the writing style and the effectiveness of communication by the writer. The guidelines provide helpful thought questions that will assist you prepare your review.

You can find the guideline PDF at this link: guidelines FOR PROPOSAL REVIEW.pdf

Grading

Assessment of this assignment will be in two parts: 1) peer review from students and 2) final review by instructor. Students will use a Canvas rubric to evaluate their classmates (See page on Peer Evaluations).

- The draft of this assignment is due Oct. 22 via electronic submission to canvas. A draft version is required and will constitute 10 points (20%) toward your final grade.
- Peer reviews (each student must complete 3) are due Oct 29. Students should use the assignment rubric in Canvas to prepare their peer reviews. Peer review scores (average of top 2 scores of the 3 peer reviews) will constitute 10 points (20%) of the final grade. The peer review score will be manually calculated and entered as part of the point total for the draft assignment.
- Should you fail to complete your peer reviews for other students, 5 points for each missing peer review will be deducted from your point total.
- The final version of the assignment, which incorporates revisions inspired by comments from peers and the instructor, is due Nov 12.

<table>
<thead>
<tr>
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<th>Due date</th>
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<td>10</td>
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<tr>
<td>Final version</td>
<td>Nov. 12</td>
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50 points total
Popular Research

Assignment objective

Students will develop skills for writing about complex scientific topics in language that is accessible to a generalized audience.

This assignment is linked to these course objectives:

- Students will develop skills for science communication via oral and written presentations for technical and lay audiences.
- Students will learn how to find and use resources for preparing science articles, proposals or public materials.
- Students will analyze and critically evaluate the role of science and scientists in local, national and global community.

General guidelines

This assignment has only one "option", although you may choose any paper you like for completing the assignment.

Select a science article intended for an expert audience and prepare a short paper translating this material for a general audience using the format of Environmental Health News (example 1 (Links to an external site.))Links to an external site.; example 2 (Links to an external site.)Links to an external site.). You must follow these examples and use the headings indicated in formatting your essay, which should include the following sections: A title (not the article title); the citation for the article you are translating; a lede paragraph (what is the most important information to convey?); section titled What did they do? (how was the study conducted?); section titled What did they find? (What were the key observations?); section titled What does it mean? (or why should anyone care?); section titled Context (background information on the subject that would be useful to the reader); and finally Resources (other authoritative articles or websites that are useful for further reading.) The final product should be appropriate for publication on a science news website. Target length is up to 500 words.

Please carefully review your prepared text for correct spelling, grammar and sentence structure. Always remember that a reader will have a more favorable view of your writing if you make it easy for them to read it. An evaluation rubric for essays is provided below.

Grading & due dates

Assessment of this assignment will be in two parts: 1) peer review from students and 2) final review by instructor. Students will use a Canvas rubric to evaluate their classmates (See page on Peer Evaluations).

- The draft of this assignment is due Oct 29 via electronic submission to canvas. A draft version is required and will constitute 10 points (20%) toward your final grade.
- Peer reviews (each student must complete 3) are due Nov 5. Students should use the assignment rubric in Canvas to prepare their peer reviews. Peer review scores (average of top 2 scores of the 3 peer reviews) will constitute 10 points (20%) of the final grade. The peer review score will be manually calculated and entered as part of the point total for the draft assignment.
- Should you fail to complete your reviews for other students, 5 points for each missing peer review will be deducted from your point total.
- The final version of the assignment, which incorporates revisions inspired by comments from peers and the instructor, is due Nov 19
<table>
<thead>
<tr>
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<tr>
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<td>10</td>
</tr>
<tr>
<td>Final version</td>
<td>Nov 19</td>
<td>30</td>
</tr>
</tbody>
</table>

50 points total
Critique Science Seminar

Assignment objective

By preparing critiques of scientific seminars offered by experts (or newly minted scientists), students will gain perspective on best practices for oral presentations that they can implement in their own oral presentation to be given later in the term.

This assignment is linked to these course objectives:

- Students will develop skills for communicating specialist knowledge to science peers and to non-specialist audiences.
- Students will develop skills for science communication via oral and written presentations for technical and lay audiences.

General guidelines

During the course of the semester (prior to November 15), attend a scientific seminar by any faculty, guest speaker or graduate student (i.e., thesis or dissertation defense seminar) from any department on any topic of interest to you. You can find information on scheduled seminars from most academic department offices; announcements are also often posted on bulletin boards in research buildings. The seminar should be about 45 to 60 minutes in length.

Here is the critique sheet you can use to help you evaluate the seminar and prepare your paragraph: Student evaluation form.docx

(This is the same form we'll use at the end of term for peer evaluations of presentations).

Prepare a paragraph critiquing the seminar for content, the speaker’s style and the presentation style. Be prepared to present your critique in a group discussion during class on Nov 6. The essay length should be about 250 words. Please carefully review your prepared text for correct spelling, grammar and sentence structure. Always remember that a reader will have a more favorable view of your writing if you make it easy for them to read it.

Grading and due date

This assignment is due November 6, 2013 by 12:00pm via online submission through Canvas (submit prior to attending class that day). This assignment will not involve peer review or revisions.

<table>
<thead>
<tr>
<th>Assignment Element</th>
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<th>Available points</th>
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<tr>
<td>Final version</td>
<td>Nov 15, 12pm</td>
<td>25</td>
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Oral Presentation: Version for in class presentation

Assignment objective

Students will implement best practices for oral presentations by preparing and delivering a presentation on a scientific topic of their choice for either specialist or lay audiences.

This assignment is linked to these course objectives:

- Students will develop skills for communicating specialist knowledge to science peers and to non-specialist audiences.
- Students will develop skills for science communication via oral and written presentations for technical and lay audiences.
- Students will apply course material to improve thinking, problem solving and decisions through course activities, including class discussions and oral and poster presentations.

General guidelines

Oral presentations will be given in class on Nov 27, Nov 29, Dec 4 and Dec 6.; a schedule for presentations will be determined the prior week, though all presentation PowerPoint files must be submitted electronically to Canvas by November 27. Please do not make substantial changes to your presentation after that date, in order to be fair to any classmates that present in the first or second groups. A rubric for evaluation of oral presentations is provided below.

After your presentation, you may edit your slides and submit a revised final version by December 11th. During the oral presentations, students shall complete anonymous peer reviews of all presentations to aid in your revisions (in addition to my comments). (FYI, given the timing of the presentations, these peer reviews will not count toward the final grade.)

Select from one of the two assignment options outlined below.

Assignment option 1: Prepare a 10 minute seminar that outlines your current research intended for an audience of your peers at a science conference. You are welcome to include any data you may already have, or to outline your planned research program. The presentation should have an introduction, outline a hypothesis, describe research approaches (or data), emphasize key findings and potential new directions of research. Expect each slide to take about 1 minute to present. You should also leave time (about 2-3 minutes) for answering questions from your fellow students. Though this is a technical talk, keep in mind that your audience has a diverse science background.

Assignment option 2: Prepare a 10 minute seminar describing your area of study or research intended for presentation to the public at a university open house event. This presentation should have an introduction, a primary question to be addressed, information slides addressing said question, and a conclusion. Expect each slide to take about 1 minute to present. You should also leave time (about 2-3 minutes) for answering questions from your fellow students. Keep in mind that your target audience for this presentation my have little to no science background, and that many may have last studied science as teenagers!

Grading and due dates

Assessment of this assignment will be in two parts: 1) peer review from students and 2) final review by instructor. Students will use a Canvas rubric to evaluate their classmates (See page on Peer Evaluations).

- The version of the oral presentation that will be delivered to class must be uploaded as a PowerPoint file to Canvas on Nov. 27 via electronic submission to canvas.
• Students will provide peer reviews for all presentations, but due to the timing, these will not count toward part of the grade. All students are expected to attend class on all 4 days of presentations and give peer reviews.
• If you desire, revisions to the oral presentation can be made and the final version submitted no later than Dec 11. Because of the size of the class, it will not be possible to have repeated delivery of the presentation. Thus, students should practice their talk in advance of their presentation date.
• This assignment will have a total value of 75 points, based primarily on the oral delivery of the presentation and the final version of the PowerPoint slides.

<table>
<thead>
<tr>
<th>Assignment Element</th>
<th>Due date</th>
<th>Available points</th>
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</thead>
<tbody>
<tr>
<td>Version for oral presentation</td>
<td>Nov 27</td>
<td></td>
</tr>
<tr>
<td>Final ppt file for grading</td>
<td>Dec 11</td>
<td>75 points</td>
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</table>
Poster presentation & Poster Session

Assignment objective

Students will implement best practices for poster presentations by preparing and delivering a presentation during a formal poster session on a scientific topic of their choice for either specialist or lay audiences.

This assignment is linked to these course objectives:

- Students will develop skills for communicating specialist knowledge to science peers and to non-specialist audiences.
- Students will develop skills for science communication via oral and written presentations for technical and lay audiences.
- Students will apply course material to improve thinking, problem solving and decisions through course activities, including class discussions and oral and poster presentations.

General guidelines

You should prepare a poster presentation that corresponds with your selected oral presentation topic using PowerPoint. The draft presentation is due via electronic submission on Canvas by November 27 (more details below on due dates). Students will provide peer reviews within one week to allow for revisions and printing of a final version of your poster for a small Poster Session during the final exam time for this class, December 11th 1:30 to 3:20pm.

During the Poster Session, half the class will tour posters while the other half will present their poster. I will also invite other students and faculty from the department to our event. A rubric for evaluation of poster presentations is provided in the course syllabus. Location for poster session to be announced.

Select from one of the two assignment options below.

Assignment option 1: Prepare a scientific poster that outlines your current research intended for an audience of your peers at a science conference. You are welcome to include any data you may already have, or to outline your planned research program. Each poster should include these basic sections: Title, Introduction, Objectives/Hypothesis, Approach, Results (if applicable; expected findings if data not available), Conclusions, References.

Assignment option 2: Prepare a display poster describing your area of study or research intended for presentation to the public at a university open house event. You have more flexibility on the design of this poster, but it should include a title section, introduction, a primary question, information addressing that question, conclusions and any relevant references. One way to think of this option is as an oversized pamphlet or brochure that explains a scientific topic to a general audience. To get ideas, you could pick an area of research relevant for your major or interview a faculty member in your department.

Formatting guidelines and printing

Each poster should be sized 36w" x 48h" to accommodate the space we will be using. A vertical orientation is preferred for this event for space concerns. You can get posters printed rather cheaply at the USU Publication Design and Production, office located just east of the Women's soccer field. You can expect a turn-around of about 48 hrs for your poster. I would walk it over personally to make sure that the instructions for printing are clear. Also, make sure that you have a PPT and high quality PDF version of the poster available. If your poster was not made at final size, then make sure to tell them the appropriate scale up needed. Take it from me, this is definitely NOT something to wait on until the last minute. Cost of printing is estimated at about $40 for the least expensive paper. The expense of poster printing is the student's responsibility.
Another option for printing is through Engineering department, though I do not know the fee for printing: https://engineering.usu.edu/students/open-access-computer-labs/poster-submission (Links to an external site.)

For the poster session, half of the class will hang their posters and present in the first hour. The other half will be guests and mill around to ask questions about the posters. After an hour, we'll flip. The second cohort will quickly put up their posters and the first will ask questions. The posters will be hung using packing tape adhered to the back of the poster attached to the metal frame around the glass windows surrounding the atrium. No tape on glass!

**Grading and due dates**

Assessment of this assignment will be in two parts: 1) peer review from students and 2) final review by instructor. Students will use a Canvas rubric to evaluate their classmates (See page on Peer Evaluations).

- The draft of this assignment is due Nov. 27 via electronic submission to canvas. A draft version is required and will constitute 10 points (13%) toward your final grade.
- Peer reviews (each student must complete 4) are due Dec. 4. Students should use the assignment rubric in Canvas to prepare their peer reviews. Peer review scores (average of top 3 scores of the 4 peer reviews) will constitute 15 points (20%) of the final grade. The peer review score will be manually calculated and entered as part of the point total for the draft assignment. Please note that for this assignment, you will each have one additional peer review to complete, as peer reviews for the oral presentations are not practical.
- Should you fail to complete your reviews for other students, 5 points for each missing peer review will be deducted from your point total.
- The final version of the assignment, which incorporates revisions inspired by comments from peers and the instructor, is due Dec 11 and will be presented at a poster session during the course final exam time (location TBD). The final version will be worth 50 points, or 67% of the total assignment.

<table>
<thead>
<tr>
<th>Assignment Element</th>
<th>Due date</th>
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<tbody>
<tr>
<td>Draft</td>
<td>Nov. 27</td>
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<tr>
<td>Peer reviews (4 total; top 3 scores count)</td>
<td>Dec. 4</td>
<td>15</td>
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<tr>
<td>Final version</td>
<td>Dec. 11</td>
<td>50</td>
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<td></td>
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</table>
### Rubric for evaluation of essays

<table>
<thead>
<tr>
<th>Category</th>
<th>Excellent</th>
<th>Good</th>
<th>Okay</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus and details</td>
<td>There is one clear, well-focused topic. Main ideas are clear and are well supported by detailed and accurate information.</td>
<td>There is one clear, well-focused topic. Main ideas are clear but are not well supported by detailed information.</td>
<td>There is one topic. Main ideas are somewhat clear.</td>
<td>The topic and main ideas are not clear.</td>
</tr>
<tr>
<td>Organization</td>
<td>The introduction is inviting, states the main topic and provides an overview of the paper. Information is relevant and presented in a logical order. The conclusion is strong.</td>
<td>The introduction states the main topic and provides an overview of the paper. A conclusion is included.</td>
<td>The introduction states the main topic. A conclusion is included.</td>
<td>There is no clear introduction, structure or conclusion.</td>
</tr>
<tr>
<td>Voice</td>
<td>The author’s purpose of writing is very clear, and there is strong evidence of attention to audience. The author’s extensive knowledge and/or experience with the topic is/are evident.</td>
<td>The author’s purpose of writing is somewhat clear, and there is some evidence of attention to audience. The author’s knowledge and/or experience with the topic is/are evident.</td>
<td>The author’s purpose of writing is somewhat clear, and there is evidence of attention to audience. The author’s knowledge and/or experience with the topic is/are limited.</td>
<td>The author’s purpose of writing is unclear.</td>
</tr>
<tr>
<td>Sentence structure, grammar, mechanics and spelling</td>
<td>All sentences are well constructed and have varied structure and length. The author makes no errors in grammar, mechanics and/or spelling.</td>
<td>Most sentences are well constructed and have varied structure and length. The author makes a few errors in grammar, mechanics and/or spelling, but they do not interfere with understanding.</td>
<td>Most sentences are well constructed, but they have a similar structure and/or length. The author makes several errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
<td>Sentences sound awkward, are distractingly repetitive or are difficult to understand. The author makes numerous errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
</tr>
</tbody>
</table>


**Rubric for evaluation of presentations** (slide refers to oral presentation; section to poster presentation)

<table>
<thead>
<tr>
<th>Category</th>
<th>Excellent</th>
<th>Good</th>
<th>Okay</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus and details</strong></td>
<td>There is one clear, well-focused topic. Main ideas are clear and well supported by detailed and accurate information.</td>
<td>There is one clear, well-focused topic. Main ideas are clear but are not well supported by detailed information.</td>
<td>There is one topic. Main ideas are somewhat clear.</td>
<td>The topic and main ideas are not clear.</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>The introduction is inviting, states the main topic and provides an overview of the paper. Information is relevant and presented in a logical order. The conclusion is strong.</td>
<td>The introduction states the main topic and provides an overview of the paper. A conclusion is included.</td>
<td>The introduction states the main topic. A conclusion is included.</td>
<td>There is no clear introduction, structure or conclusion.</td>
</tr>
<tr>
<td><strong>Visual attributes; Use of diagrams, figures and tables</strong></td>
<td>The design is polished with a very professional appearance. Slides/sections are visually pleasing and aid the viewer in comprehension of presented material. Figures, tables and other diagrams are quickly interpreted and appropriate to the topic discussed.</td>
<td>The design is polished. Slides/sections are visually pleasing and aid the viewer in comprehension of presented material. Figures and other diagrams are included.</td>
<td>The design is not offensive, but does not look polished or professional. Use of figures, diagrams and tables does not facilitate understanding of the material presented.</td>
<td>The design detracts greatly from the presentation content and/or is not visually pleasing. Use of figures, tables and/or diagrams is poorly executed and does not facilitate understanding of the material presented.</td>
</tr>
<tr>
<td><strong>Sentence structure, grammar, mechanics and spelling</strong></td>
<td>Titles to the slides/sections provide key information to guide the audience through the talk. The text is concise and accurately conveys important concepts; text is well-organized using bulleted or numbered lists. The presenter makes no errors in grammar, mechanics and/or spelling.</td>
<td>Titles are relevant to the slide/section content. Modest amounts of text are used; text is well-organized using bulleted or numbered lists. The presenter makes few errors in grammar, mechanics and/or spelling.</td>
<td>Titles to the slides/sections are included, but are not very useful in guiding the audience through the talk. The presenter uses more text than is necessary. The presenter makes several errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
<td>Titles to the slides are not relevant to the text or the author's discussion of the slide content. The presenter uses excessive text. The presenter makes numerous errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
</tr>
<tr>
<td><strong>Presenter skills</strong></td>
<td>Presenter speaks easily with confidence, enthusiasm and authority on the topic. Presenter keeps on topic and spends an appropriate amount of time on each slide/figure. Presenter follows guidelines for presentation length/size. The presenter appears very comfortable with the technology. Presenter answers questions with respect and clear evidence of knowledge.</td>
<td>Presenter speaks easily on the topic. Presenter spends an appropriate amount of time discussing each slide/section. Presenter follows guidelines for presentation length/size. Presenter is comfortable with technology and attempts to answer questions.</td>
<td>Presenter appears unrehearsed and unfamiliar with some presentation content. Presenter spends too much time on some sections of the presentation. Presenter goes beyond the guidelines for length/size of the presentation. Presenter is unable to answer questions, or has difficulty working with the technology.</td>
<td>Presenter becomes flustered or agitated during presentation. Presenter is unfamiliar with presentation content, tends to read text directly from the slide/sections. Presenter does not follow guidelines for length/size at all. Presenter becomes combative when answering questions or is unable to do so. Presenter has difficulty working with the technology.</td>
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