

Winter and Spring 2015
UnSt 421 section 321
Research experience for science majors

Instructor: Erik Bodegom, Department of Physics	Grading:
Phone: 5-4230	Class Participation: 30%
Email: Bodegom@pdx.edu	Research activities: 30%
Office: room 150 SRTC	Classroom Presentations: 10%
Office hrs: Monday 1130-1230 and by appointment	Powerpoints: 10%
Class time: TR 18:30-20:20	Final report: 20%

Learning Objectives

Students enrolled in this course will develop an understanding and appreciation for scientific, societal, economic, political, and ethical dimensions of physics. This will be accomplished through the initial weekly readings and subsequent discussions of overarching publications on the subject of the role of science.

- Scientific dimension: we will address the science needed to address the community partner's need, ways of acquiring the missing knowledge, ways of presenting the final product that is inline with standard scientific practice (in the reading list see "Error analysis" and "Experimentation")
- Societal implications: too often science is done without any regard to its societal implications (see how scientist are trying to address this in the case of nanotechnology or how it failed in the case of genetically modified foods).
- Economic dimension: we will address the issue of patentability, copyrights, and trade secrets by means of the assigned readings (see: "Survival skills" and "Patents")
- Political dimension: see the readings from the newsletters from the "Forum on Physics and Society."
- Ethical dimension: the issue of fraud as exemplified by Woo Suk Hwang (stem cell research) or Victor Ninov (claimed to have produced two new elements and falsified data) and the ethics of scientists.
- Aesthetical dimension: the issue of presentation of scientific results and how this impacts funding and recognition; and the tension often felt between aesthetics and science.

Literature and reading List

Research:

Philip R. Bevington and D. Keith Robinson: Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill Education, 2002

David C. Baird, Experimentation: An Introduction to Measurement Theory and Experiment Design, Prentice Hall, 1995

Scientific careers:

Federico Rosei and Tudor Johnston, Survival Skills for Scientists, Imperial College Press 2006

Alternative careers in science: leaving the ivory tower, edited by Cynthia Robbins-Roth, Academic Press 1998

Economic aspects:

Craig Hovey, The Patent Process, Wiley, 2001

<http://www.sigmapisigma.org/governance/ethics/tenure.pdf>

Societal dimension (nanotechnology, climate, energy efficiency):

<http://link.springer.com/article/10.1007%2Fs11569-008-0033-z>

<http://link.springer.com/article/10.1007%2Fs11569-007-0006-7>

<http://link.springer.com/article/10.1007%2Fs11569-007-0011-x>

<http://dels.nas.edu/Climate/Climate-Change/Reports-Academies-Findings>

<http://www.aps.org/energyefficiencyreport/summary/energyexecsum.pdf>

Political aspects (three topics: climate, nuclear weapons, evolution):

<http://www.aps.org/units/fps/newsletters/200807/hafemeister.cfm>

<http://www.aps.org/units/fps/newsletters/200807/monckton.cfm>

<http://www.aps.org/units/fps/newsletters/200810/weart.cfm>

<http://www.aps.org/units/fps/newsletters/200804/oelrich.cfm>

<http://www.aps.org/units/fps/newsletters/2008/january/article-hafemeister.html>

<http://www.aps.org/units/fps/newsletters/2008/january/article-hobin.html>

Fraud and ethics:

<http://www.time.com/time/magazine/article/0,9171,1137709,00.html>

http://en.wikipedia.org/wiki/Hwang_Woo-Suk

<http://www.aps.org/units/fps/newsletters/201007/upload/july10.pdf> pp20-21

Aesthetics:

http://www.mukto-mona.com/new_site/mukto-mona/Articles/aparthib/science_aesthetics.htm

https://openaccess.leidenuniv.nl/bitstream/1887/10225/1/9_57_005.pdf

On collaboration, writing, presenting, and publishing:

Bourne, P. and L. Chalupa, "Ten simple rules for getting grants." *PloS Comput Biology* **2(2)** e12 (2006)

Bourne, P. "Ten simple rules for getting published." *PloS Comput Biology* **1(5)** e57 (2005)

Vicens, Q. and P. Bourne. "Ten simple rules for a successful collaboration." *PloS Comput Biology* **3(3)**, e44 (2007)

Bourne, P., "Ten Simple Rules for Making Good Oral Presentations." *PLoS Comput Biol* **3(4)** e77 (2007)

http://www.how-to-write-a-resume.org/cover_letter_tips.htm and <http://www.saylor.org/courses/prdv102/>

http://www.how-to-write-a-resume.org/resume_writing_tips.htm

<http://link.springer.com/article/10.1007%2Fs11948-002-0017-2>

The rubric used for assessment of communication skills is attached as is the request for your participation in a study of the Learning Goal of Communication.

Assignments:

All word documents should be double spaced, 10-point font, 1" margins.

No spelling errors or typos, grammatically correct, i.e. you better proofread.

Each group of three or four writes a 10-page report on one of the discussion items for this course and presents this in class (20 mins).

Write a CV – submit online January 23.

Final report should be in the form of a physics (or other relevant science) journal article, unless we have agreed to a different format.

List of past research projects:

Snowman, Biosensors, Programming, Atmospheric research, Photography, Solar cells, Bones. If you have an idea or are working on something, let me see if that project is acceptable (there is an extremely high chance that it is).

Schedule Winter term (tentative):

January 6: initial meeting

January 13: updates and resume/CV online

January 23: submit resume/CV online

January 27: updates and discussion of resumes

February 3: updates and discussion

February 10: updates and finalize groups

February 17: updates, rules for presentations

February 26: submit draft of group paper online

March 3: interim presentations and feedback on group papers

March 10: interim presentations and feedback on group papers

Schedule Spring term (tentative):

April 1: updates

April 15: group presentations

April 18: submit group presentations and papers online

April 22: updates and scheduling final presentations

May 6: individual presentations

May 13: individual presentations

May 20: individual presentations, final class meeting to be continued

May 31: submit final individual presentation and paper, online: important step...

Capstone Courses and the Learning Goal of Communication

Purpose: The purpose of the Capstone is to serve as the culminating general education course experience at PSU, allowing students to apply academic learning to address a real issue in our community. The purpose of this community-based portfolio project—one aspect of the program assessment University Studies undertakes every year—is to capture the wide variety of ways that students enhance their communication skills in the classroom and in the community through direct interactions and indirect service projects in partnership with a variety of agencies. This may be demonstrated through evidence of student learning through group work, oral communication in class or the community, writing, and other course mechanisms through which students engage with the goal of “communication.”

Context: Capstone courses are expected to engage students in projects that require them to apply the expertise learned in the classroom to address real issues in the community (consistent with PSU’s motto to “Let Knowledge Serve the City”). The Capstone has four goals: communication, critical thinking, diversity of human experience, and social and ethical responsibility. Each year students report in Capstone course evaluations that the course enhanced their communication skills, and faculty reinforce this view through their own observations and course-based evaluative processes. What doesn’t get captured on course evaluations, though, is *how* this improvement came about. In addition, we don’t know *in what ways* students improved their ability to communicate effectively (did they become stronger writers, more competent public speakers, more effective in collaborative teams...?).

This year, we will consult a new writing rubric developed last year by a group of faculty from every level of University Studies as we assess Capstone course portfolios. (See rubric, attached.) During our collaborative review of course portfolios, participants will apply the rubric to student work samples to determine how and in what ways the Capstone course has provided students with the opportunity to perform one or more of the following:

- Write reflective essay(s) analyzing new insights and growth developed as a result of working with a team/group (e.g. roles that they and others assumed in the group, the effective distribution of labor, the dynamic nature of interpersonal communication, effective approaches to collaborative writing with peers, and so on);
- Document learnings regarding communication skills developed while working with a community partner (e.g. communicating across difference and communicating in a professional organizational setting);
- Identify enhanced oral communication skills developed as a result of the Capstone (e.g. conflict resolution, navigating across difference, listening, public speaking and presentations with various stakeholders (class colleagues, community members, and/or institutional stakeholders));
- Provide evidence of growth in writing skills (ex: writing for a public audience, developing a greater sense of one’s “voice” in writing, editing)
- Practice various forms of professional writing (ex: technical writing, grantwriting, marketing and public relations, writing for online venues, writing articles for newspapers, journals, or magazines);
- Engage in iterative communication processes involving brainstorming, drafting, giving and receiving feedback, revising, editing, and polishing work for one or more audiences (such as a presentation, a white paper, or an artifact for a community partner).
- Further students’ meta-cognition skills, enhancing their ability to articulate how they deepened their abilities to reflect on and name their learnings and the meaning those learnings have for them.

Capstone Course Portfolio Materials

First, review the course page for your Capstone by visiting <http://capstone.unst.pdx.edu/search-courses> and searching for your last name using the search box. Please send any materials that need to be updated to Rowanna Carpenter, carpenterr@pdx.edu.

Due Dates for Winter courses	Due Dates for Spring courses	
DEC. 11 3-4:30 in 117CH	End of Winter term dates TBD	Required orientation meeting for faculty participating in the assessment project. This orientation will offer participants an overview of the process, clarify procedures, and give faculty the opportunity to talk about the teaching and learning that takes place in their Capstones related to the Communication goal.
March 20	May 20	<p>Course materials, <i>which will be made public in the online course portfolio.</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Course Syllabus <input type="checkbox"/> Instructions for course assignment related to the Communication goal <input type="checkbox"/> The final product, if at all feasible. If the actual product is not available, please provide a rich description of the final product for your course.
March 20	June 10	<p>Student responses to the assignment, <i>which will not be made public and will only be used for assessment purpose.</i> If these are not in electronic format, please contact Rowanna Carpenter, carpenterr@pdx.edu.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Submit at least 5 examples of student responses to your assignment with student permission (see attached consent form).
Pending	Pending	<p>Pending the availability of a UNST videographer, UNST will invite you to participate in the creation of a short video of you, your students, and/or your community partner which reflects the student learning experience in your Capstone. Seanna Kerrigan (kerrigans@pdx.edu) will be in contact with you to confirm this portion of the portfolio.</p>
End of Spring term	End of Spring term	<p>In an effort to involve faculty more fully in Capstone assessment practices, we invite all faculty who submit course portfolio materials this year to participate in a conversation about our Communication learning goal. Please hold Wednesday, June 17, 2015, 9:30-3:30 in your calendar to participate in this collegial gathering of faculty to share course materials and review student work together.</p>

University Studies 2014-15

Student Work Sample Consent Form

University Studies faculty and administrators are always looking for ways to improve the program. As part of this ongoing assessment effort, you are invited to take part in an annual research study that looks at how well University Studies is advancing student learning under the four University Studies goal areas (Inquiry and Critical Thinking, Communication, The Diversity of Human Experience, and Ethical and Social Responsibility). About 25% of students in participating Capstone courses are being invited to participate.

What Will I Have to Do?

University Studies would like your permission to collect and analyze a written assignment that you complete in your Capstone, after the course is over and grades have been submitted. Results of the analysis will be used to assess and improve the University Studies program.

Are There Any Risks?

Your participation is voluntary. Your decision about whether you take part in this study will not affect your course grade or your relationship with your instructor or Portland State University. If you decide to participate in the study, you may withdraw your consent at any time, without penalty. In participating, you are not waiving any legal claims, rights, or remedies.

What Are the Benefits?

By looking at a sample of student writing, we can tell where the program is strong and where it needs improvement. In past years, information gathered in this study has resulted in better faculty training, improvements in course materials, and reallocation of resources to improve student learning in particular areas. By identifying exactly where more programmatic emphasis is needed, this study helps University Studies use its resources in a manner most beneficial to students. The results of this study also help to give University administration a clear idea of the program's accomplishments, supporting the program's requests for additional resources and satisfying national accreditation requirements.

What Are You Doing to Protect Me?

All information from this study will be kept confidential to the extent permitted by law, and the names of all students participating in the study will be kept confidential. The information you provide on this form will be secured in the Office of Institutional Research and Planning. Any reports or other findings related to your work sample will be summarized in a manner that assures confidentiality. If excerpts from your work sample are used in publications or presentations, any information that can identify you or be linked to you will be kept confidential.

Whom Can I Call With Questions?

If you have questions about this study, please contact Rowanna Carpenter, University Studies Assessment Coordinator, at 503-725-3445, carpenterr@pdx.edu. If you have concerns or problems about your participation in this study or your rights as a research participant, please contact Human Subjects Research Review Committee, Office of Research and Sponsored Projects, 600 Unitus Building, Portland State University, 503 725-4288.

Please indicate on the next page whether or not you agree to participate in the 2014-15 Student Work Sample Review, allowing researchers to use your work as part of their research analysis. If you change your mind later, please contact your instructor or the researcher at the numbers above.

University Studies 2014-15

Student Work Sample Consent Form

1) Your first and last names:

2) Your PSU Student ID number:

3) The name of your course:

4) Your instructor's last name:

5) Please tell us whether you are willing to participate in the University Studies Student Work Sample Review:

YES, I AGREE TO PARTICIPATE in the study, allowing the researchers to use my work sample as part of their research analysis. I understand that I can withdraw my consent at any time by contacting my instructor or the UNST Assessment Coordinator.

NO, I DO NOT AGREE TO PARTICIPATE in the research study.

	4	3	2	1
Context, Audience, Purpose	Demonstrates a thorough understanding of context, audience, and purpose. Consistently shows awareness of both audience and genre through word choice, style, and format. Content shows strong engagement with the purpose of the work, and the needs and interests of the audience.	Demonstrates adequate consideration of context, audience, and purpose. Shows some awareness of both audience and genre through word choice, style, and format. Content generally shows engagement with the purpose of the work, and the needs and interests of the audience.	Demonstrates some awareness of context, audience, purpose. May show some recognition of genre conventions, but overall the language, style, and organizational choices are not fully appropriate. Content shows little engagement with the purpose of the work, and the needs and interests of the audience.	Demonstrates minimal attention to context, audience, purpose. Shows almost no attempt to address the needs of the audience and the conventions of the genre.
Content Development	Consistently uses appropriate, relevant, and compelling evidence (e.g., texts, observation, narrative) to explore ideas and effectively convey a point of view, demonstrating a complex and thorough understanding of the subject. Evidence is used for a variety of purposes, including as subject for analysis, to support ideas, to provide context, and to present counterpoints.	Uses appropriate and relevant evidence (e.g., texts, observation, narrative) to explore ideas and convey a point of view. Evidence is generally compelling and is used for more than one purpose, including as subject for analysis, to support ideas, to provide context, and to present counterpoints.	Sometimes uses appropriate, and relevant evidence (e.g., texts, observation, narrative) to explore ideas or convey a point of view. Some evidence is compelling and may be used for more than one purpose, but ideas are not fully developed.	Demonstrates minimal use of evidence to develop ideas or convey a point of view. Evidence is not consistently relevant.
Synthesizing Ideas	Skillfully synthesizes ideas and contextualizes sources integrating their own thoughts with those of others. Consistently uses summary, quotes, paraphrase, as well as framing and signal phrases. Sources are accurately attributed using a consistent citation format appropriate for the discipline of the writing.	Synthesizes ideas and contextualizes sources, generally integrating their own thoughts with those of others. Often uses summary, quotes, paraphrase, as well as framing and signal phrases. Sources are accurately attributed using a consistent citation format appropriate for the discipline of the writing, though there might be small errors in attribution.	Some attempt to synthesize ideas and contextualize sources. Makes some use of summary, quotes, paraphrase, as well as framing and signal phrases. There is some attempt to attribute sources, but it is not always accurate.	Little attempt to synthesize ideas and contextualize sources, and almost no attempt at synthesis (e.g., patchwork writing). Minimal attempt to attribute resources but it is not adequate or accurate.
Process	Demonstrates an understanding of writing as a generative and purposeful thinking process. Reflections and/or work samples provide evidence of strong engagement with effective writing and revision techniques, including brainstorming, drafting, workshopping, revising, editing, and proofreading. Incorporates feedback from others with a sense of authorial choice or responsibility.	Approaches writing as a generative and purposeful thinking process. Reflection and/or work samples provide evidence of engagement with effective writing and revision techniques, including brainstorming, drafting, workshopping, revising, editing, and proofreading. Incorporates feedback from others.	Attempts to use writing as a generative and purposeful thinking process. Reflection and/or work samples provide limited evidence of use of effective writing and revision techniques, including brainstorming, drafting, workshopping, revising, editing, and proofreading. Makes surface-level response to feedback.	Shows little evidence of the use of writing as a generative and purposeful thinking process. Reflection and/or work samples provide minimal evidence of use of effective writing and revision techniques. Makes no attempt to respond to feedback.
Organization and Structure	Demonstrates a clear understanding of organization and structure. Paragraphs are focused and there are strong transitions between ideas. The structure is consistently appropriate to the audience, purpose, and/or discipline.	Demonstrates an awareness of organization and structure. Most paragraphs are focused and there are often strong transitions between ideas. The structure is generally appropriate to the audience, purpose, and/or discipline.	Demonstrates some awareness of organization and structure. Several paragraphs may not be focused and there are few transitions between ideas. The structure is not always appropriate to the audience, purpose, and/or discipline.	Demonstrates little awareness of organization and structure. Paragraphs are generally unfocused and there is a lack of transitions between ideas. Structures are not appropriate to the audience, purpose, and/or discipline.
Grammar and Mechanics	Demonstrates agile control of syntax, vocabulary, and mechanics. Skillfully communicates meaning to readers with clarity and fluency. Is virtually error free.	Demonstrates control of syntax, vocabulary, and mechanics. Uses straightforward language and may attempt to use more complex language and sentence structures. There are few errors and almost none of the errors are likely to impede the reader's understanding of the ideas.	Demonstrates some control of syntax, vocabulary, and mechanics. Includes multiple errors, some of which may impede a reader's understanding of the ideas.	Demonstrates little control of syntax and mechanics. Uses language that frequently impedes meaning because of errors in usage.