Physics 391/491
Jr & Sr Seminars
Spring 2015

Time: 11:00 -12:20 pm, MWF (check schedule for specific Jr or Sr 'independent days')	Instructor: Eric Hill
Location: Appleton 101 as well as 102 and 131 and occasionally the Commons "Meeting Room"	E-mail: eric_hill@redlands.edu
Office Hours: TBA	Office: Appleton 127
Text: The Craft of Scientific Writing, 3rd ed. M. Alley	Phone: ext. 8659

There's more to using your physics education than simply 'doing' physics. This pair of seminars aims to help you with some of the other pieces. For the Juniors, there's thinking about where you want to go with your Physics degree, choosing and applying for a summer experience that will help you get there, deciding what research to do for your thesis, and even starting to think about the Physics GRE. For the Seniors, there's writing your Thesis and presenting your work. A common skill for much of this is 'communicating scientific ideas', which is both challenging and essential for any future that draws on your physics education. Thus it is one of the emphases of our Physics Program, along with developing your theoretical, computational, and experimental skills.

Policies and Expectations

Objectives:

Juniors will…	**Seniors will…**
• Plan your senior project, • critically read scientific literature and engage in scientific discourse, • supply constructive criticism when evaluating the work of peers, • communicate scientific results in written and oral form.	• wrap-up your senior project, • critically read scientific literature and engage in scientific discourse, • supply constructive criticism when evaluating the work of peers. • communicate scientific results in written and oral form.

Text: *The Craft of Scientific Writing* (3rd edition) by Michael Alley will be a resource for participants in both Junior and Senior seminars. Of course, this means that participants in the Senior Seminar are already familiar with the book from when you took Junior Seminar, but you'll probably find that, now you have a significant document you're working on, it's well worth reviewing.

Teams: The Junior and Senior Seminars enjoy a symbiotic relationship. Participants in the two seminars have distinct but related goals and roles. Much of your work will be structured around teams consisting of one senior and two juniors; each of you will be on two teams. I'll assign them based on shared research interests. Many class periods will be devoted to working in these teams. Early in the semester, the Seniors will select readings (relevant to their research) that their teams will digest and critique. Aside from honing everyone's eye for the elements of good (and bad) scientific communication, this will also prepare the Junior team members for their role later in the semester – reviewing drafts of the Seniors' Theses.

Parts and Points: The following description of your grade's composition more generally gives you a sense of the course's composition.

Class meetings (20%): Much of the work that you'll do for this course will be done *in class*, so it's essential that you come prepared and contribute your share to the team's work during the class-time team meetings.

Practice with Scientific Writing Craft: Alley's text gives valuable guidance for writing and critiquing. Of course, it takes practice to internalize these lessons.

Exercises (12%): For many of the chapters, you'll get practice on focused exercise worksheets in small working groups during class.

Critiques (12%): In these same working groups, you'll also apply Alley's criteria to critique selected scientific readings.

Overviews (5%): The articles on which you'll practice applying Alley's criteria will actually be selected by the seniors on your teams and will be relevant to their theses. So juniors are prepared to offer informed feedback on their thesis drafts, later in the semester, they'll want to understand these articles well. To that end, with the guidance and input of the seniors on each team, the juniors will write brief overviews of each article they read.

Outlines & Drafts (20%): A strong thesis, research proposal, or application does not get generated from scratch and in one pass – it takes planning and refining. So you'll be asked to produce outlines and drafts of your work along the way. An additional benefit is that your colleagues will be able to provide you valuable feedback on your works in progress. To facilitate this, share your work in .pdf format; the latest free version of Adobe Acrobat has handy tools for placing comments on documents. Group discussions will often be based on your work so failing to turn in your work on time will adversely affect the rest of the class. Late assignments will receive an initial penalty of 20% and a penalty of 10% for each additional day late.

Major Written Works:

Seniors – Thesis (15%)**:** Ultimately, participants in the Senior Seminar will produce a Senior Thesis. Aside from being an end in its own rights, as the culminating works of these seminars, they should reflect your mastery of (written) scientific communication. If you desire (and any collaborators consent), your thesis will be published through the Armacost Library online; as the author, you will receive subsequent readership notices.

Juniors – Summer Application (5%**) & Research Proposal (**10%**):** The Summer Application serves two purposes. First, research experience is an essential component of an undergraduate physics education, so the Junior Seminar provides an occasion for you to explore and apply for positions. Second, regardless of one's educational or career path, a lot can ride on an application, so it's important to get practice with this medium. The process of creating the Research Proposal should put you in good stead for having a solid thesis come this time next year; also, the document itself is your culminating work in Junior Seminar and should reflect your mastery of (written) scientific communication.

Presentations: Oral presentation is a key mode of communication in the sciences, and it has constraints and corresponding guidelines of its own. Aside from getting practice crafting and delivering an oral presentation of your work (thesis for the Sr. Sem. and research proposal for the Jr. Sem.), presenting to a live audience gives you invaluable insight into what does and doesn't communicate well, and thus will help you be able to improve your *written* work as well.

Seniors: Initial Research Update Presentation (2%); First Thesis Segment (2%); Rough Rehearsal (2%); Dress Rehearsal (4%); Final Presentation (6%)

Juniors: Where Physics Fits Presentation (2%); Applying and Plans Presentation (3%); Research Proposal Presentation (6%)

Juniors: Sample Physics GRE (5%): There are two reasons this is included in Jr. Seminar. First, many physics graduate programs require that students take the Physics GRE, and it takes more time and effort to prepare for than many expect, so you'll appreciate why it's important to prepare over the summer, it's a good idea to sample what you'd be up against before it's too late. Second, it provides an opportunity for you to pause, look back over the different physics courses you've taken (this sampling will only really draw from Gen Phys I-III), review it, and see it as a cohesive whole; that will strengthen your foundation for the courses you take next year.

Grades: will be evaluated based on the following:

Senior Seminar		**Junior Seminar**	
Class Meetings	20%	Class Meetings	20%
Critiques	12%	Critiques	12%
Exercises	12%	Exercises	12%
Article Overviews	5%	Article Overviews	5%
Thesis Outlines & Drafts	20%	Outlines & Drafts	20%
Presentations	16%	Presentation	11%
Final Paper	15%	Final Project Proposal	10%
		Summer Applications	5%
		Sample GRE	5%

Sr. Presentations: Monday March 30th around 4 p.m., the seniors will give a presentation of their work for the department. Dinner will be served after the presentations. Regardless of whether you're presenting, you're required to attend; if you are not presenting, you will be taking notes so you can provide valuable feedback to the presenters later.

Plagiarism: Plagiarism has the potential undermine the educational process in almost any type of course, but it is particularly hazardous in these seminars which, more than any other physics courses, focus on developing your skills for communicating scientific material. So the following discussion is a tad more detailed than in my typical syllabus.

Regardless of whether it is properly cited, excessive use of another's language, diagrams, chain of reasoning, sequence of equation, etc. reduces your opportunity to hone your own skills, which is the aim of this class. Beyond that, if you'd fail to identify borrowed content as having been produced by another, i.e. plagiarize, I wouldn't have been able to accurately evaluate your skills. So, aside from the moral issue of not giving credit where credit is due, it is for this pragmatic reason – that plagiarism masks excessive use of another's work (and thus insufficient work of one's own) – that it cannot be tolerated in this class. So, I will be apt to drop from the course a person I detect plagiarizing. This is not because he or she has done a 'bad' thing and is a 'bad' person; it is because I will no longer be able to count on *any* of his/her work to accurately reflect progress toward one of the central goals of the course – in as material a way as if the student had scheduling conflict, this course simply wouldn't 'work' for him/her.

Here is a brief summary of the school's policy; you can see the *Catalog* for more details. Instructors are to report to the Registrar's office all incidents of plagiarism; the report does not become part of the student's permanent record, but is retained as long as the student is at Redlands. The student may appeal the identification of plagiarism to the Academic Review Board (ARB.) For the first incident of plagiarism that is logged with the Registrar, the instructor decides the sanction (note: the ARB can dismiss a case of plagiarism, but if the case stands, no one but the instructor can decide the sanction for a first incident.) For subsequent incidents, the ARB decides the sanction as they, and not the instructor, have access to the previous reports and thus can place the new incident in proper context.

Schedule: Just Major Dates

Since this isn't our typical text-based course, the schedule is filled with a bit more detail than usual, so it might be hard to pull out the really major dates. Here's a quick rundown:

Juniors		**Seniors**	
		5 min Update Presentation	Jan 7th
3 min Role of Physics Presentation	Jan 14th		
		Thesis Outline	Jan 22nd
Research Application Draft	Jan 27th		
		5 min Segment Presentation	Jan 30th
		Introduction Draft	Feb 1st
3 min Project Descrip. Pres.	Feb 11th		
		Another Section Draft	Feb 12th
		Yet Another Section Draft	Feb 19th
		Full Thesis Draft	Mar 1st
Proposal Abstract & Outline	Mar 8th		
		Revised Full Thesis Draft	Mar 9th
Sample GRE	Mar 13th		
Proposal Action Plan / Timeline	Mar 15th		
		Presentation rough/partial	Mar 16th
Proposal Introduction	Mar 19th		
		Presentation Dress Rehearsal	Mar 23rd/24th
Proposal Full Revised Draft	Mar 27th		
		Presentation	Mar 30th
		Thesis Penultimate Draft	Apr 3rd
Proposal Penultimate Draft	Apr 10th		
Proposal Final Draft	Apr 16th	Thesis Final Draft	Apr 16th

Tentative Full Schedule color code: Sr's only, Jr's & Sr's, Jr's only

Day	Readings and Activities	Assignments
Mon 1/5	**Intro to the Course & Oral Communication** (delivery rubric)	*Before class:* read **Forward**
Wed. 1/7	Sr's present **'why you should join my research team'** (5min, no slides) (record self with phone) Attend – take note (will later team with Sr's based on interest)	*Before class:* Email me outline of your talk *At end of class:* Critique talk using delivery rubric *Before next class:* view self-recording and critique
Fri 1/9	**Where do you go from here?** Career Center Visit & Physics Careers Sr's 'data dump' (bring computer / your work so far)	*Before next class:* take Focus II Survey, and Explore APS Undergrad Programs, APS Careers, and Physics Today Career Resources read Ch 17 through "Writing First Drafts" & sample drafts: early vs. published
Mon 1/12	**Library Visit**	*Complete the Work Values Inventory* *Go over the Important Skills slide (2nd to last) of last Monday's presentation* *Before end of day:* Email me 1pg reflection on findings from the Focus II Survey, Work Value Inventory, and "Important Skills" slide - what are your goals, strengths, and weaknesses? Email me ranking of Sr Research Projects in order of your interest *Before class:* Make appointment with your research advisor *Before class:* read Citations handout *Before next class:* List of resources from library visit (in proper format)
Wed 1/14	Jr's present '**Where Physics Fits'** (3min, explicitly drawing on Focus II) attend & critique	*Before class:* Email me outline of your talk *At end of class:* Critique talk using delivery rubric *Before next class:* view self-recording and critique
Fri 1/16	**Where to Begin & Different Audiences:** in teams, discuss sample draft's evolution and apply Ch. 1 Critique	*Before Class:* Read Ch 1 and sample drafts: early vs. published *At end of class*: turn in article critique and summary
Mon 1/19	Discuss Programs Jr's apply – good selection, others? Discuss Sr's Bibliography – what's missing?	*Before class:* Send to teammates list of at least 4 summer programs you're considering *Before next class:* Schedule follow-up with career center have acquired all resources identified in library visit. *Before class:* Send Annotated bibliography to teammates *Before next class:* Schedule follow-up with librarian
Wed 1/21	**Isms in the Physics Community**	
Fri 1/23	**Structure:** in teams, work Structure & Headings exercises and apply Ch 2&3 critiques to and summarize articles	*Before previous evening*: provide teammates with another article *Before class*: read Ch's 2 & 3 and article proved by Sr's *At end of class*: turn in exercises, critiques, and summaries
Mon 1/26	**Scientific Presentations:** sample research presentations – rubric practice **Outlines:** teams review Sr's Thesis outlines	*Before previous evening*: provide teammates with Thesis Outline *Before class:* read Ch 15 and Department Rubric *After class:* email updated outline to me and research advisor
Wed 1/28	**Summer Research Apps:** review Jr's application materials	*Before previous evening*: provide teammates with Application materials *Before next Monday*: email me your Application packet
Fri 1/30	**Presentations:** 5min segment of your Thesis presentation (with slides; record self with phone) Critique and Feedback	*Before class:* email me outline of your presentation *After class:* critique *Before next class:* self-critique
Mon 2/2	**Sr's Thesis Intro 1st Draft**: team review **Choosing a Jr's Research Project:** team discuss	*Before previous evening:* provide 1st draft of Introduction to team *Before Class:* Familiarize yourself with Department Rubric *Bring to class:* marked-up Intro 1st draft and filled out (applicable parts of) grading rubric *Before next class:* email revised Intro to me and cc research advisor
Wed 2/4	**Library Visit** **Ambiguity & Usage:** do Usage exercise in Sr groups	*Before class:* read Citations handout *Before next class:* List of resources from library visit (in proper format) *Before class:* read Appendix A & B *End of class:* hand in Usage exercise
Fri 2/6	**Language – Clear & Precise:** in teams, work Ambiguity exercises and apply Ch 4&5 critiques to and summarize articles	*Before previous evening*: provide teammates with an article *Before Class:* read Ch 4 & 5 and article proved by Sr's *At end of class*: turn in exercises, critiques, and summaries
Mon 2/9	**Language – Forthright & Familiar**: in teams apply Ch 6 & 7 critique to and summarize articles	*Before previous evening*: provide teammates with an article *Before Class:* read Ch 6 & 7 and article proved by Sr's *At end of class*: turn in critiques and summaries
Wed 2/11	**Project Description:** 3min (with slides) describe a (non-Redlands) research project you've applied for / you're interested in (record self with phone) Critique and Feedback	*Before class:* email me outline of your presentation *After class:* critique *Before next class:* self-critique
Fri 2/13	**Sr's Thesis 1st Draft of another** (not conclusion) **section**: team review	*Before previous evening*: provide teammates with 1st Draft of another (not conclusion) section of thesis *Bring to class:* marked-up 1st Draft and filled out (applicable parts of) grading rubric *Before next class:* email revised thesis section to me and cc research advisor

Mon 2/16	**Language – Concise & Fluid:** in teams apply Ch 8 & 9 critique to and summarize articles, work Numbers exercise	*Before previous evening*: provide teammates with an article *Before Class:* read Ch 8 & 9 and article proved by Sr's *At end of class*: turn in critiques, summaries, and Numbers exercise
Wed 2/18	**Format & Sitting Down to Write –** work Craft exercise	*Before Class:* read Ch 16 & 17 and Faraday paper: early through published
Fri 2/20	**Sr's Thesis 1st Draft of another** (not conclusion) **section**: team review	*Before previous evening*: provide teammates with 1st Draft of yet another (not conclusion) section of thesis *Bring to class:* marked-up 1st Draft and filled out (applicable parts of) rubric *Before next class:* email revised thesis section to me and cc research advisor
Mon. 2/23 – Fri. 2/27	**Spring Recess**	
Mon 3/2	**Illustrations -** work Illustrations exercise and discuss Sr's Illustrations	*Before previous evening*: provide teammates with Complete Thesis Draft *Before Class:* read Ch 10 & 11 *Before class:* look over thesis draft paying attention to illustrations.
Wed 3/4	**Research Proposals –** Discuss what goes into one and your options	*Before Class:* Have read Ch 13 and Proposal Handout *Bring to Class:* Notes on Research options
Fri 3/6	**Equations & Thesis Draft -** discuss Sr's Equations and other draft markups	*Before class:* Read Equations Handout *Before class:* look over thesis draft paying attention to equations. *Bring to class:* marked-up Draft and filled out grading rubric
Mon 3/9	**Proposal –** abstract & outline; discuss in Jr Groups	*Before previous evening*: provide Jr teammates with proposal's abstract & outline; *Before Class:* have read each other's' abstracts & outlines *Before next class:* have emailed me your abstract & outline Complete Thesis draft to research advisor; make apt to discuss with research advisor
Wed 3/11	**GRE** Prep – go over GRE questions	*Before Class:* visit Ohio's and Stanford's Phys GRE Prep pages *Due beginning of class*: solutions to 24 questions of your choosing in sample test
Fri 3/13	**Test: Sample GRE** excerpts (only subjects met in Gen Phys I-III)	
Mon 3/16	**Sr. Presentation** – rough/partial run through attend and provide feedback **Proposal – Action Plan / Timeline:** review in Jr groups	*Before previous evening*: provide Jr teammates with proposal's action plans / timelines; *Before Class:* have read each other's' action plans / timelines *Before next class:* have emailed me your action plan / timeline
Wed 3/18		
Fri 3/20	**Sr. Presentation Abstract & Poster** – Sr's draft poster together **Proposal – Introduction:** Discuss in Jr teams	*Before class:* write your Presentation Abstract *By end of class:* 1st draft of poster *Before previous evening*: provide Jr teammates with proposal's introduction; *Bring to class:* marked-up drafts of each other's introductions and (applicable parts of) grading rubric *Before next class:* have emailed me your introduction
Mon 3/23	**½ Sr. Presentation Dress Rehearsal** – Sr's give presentations Jr's attend in teams and provide feedback using dept rubric	
Wed 3/25	**½ Sr. Presentation Dress Rehearsal** – Sr's give presentations Jr's attend in teams and provide feedback using dept rubric	
Fri 3/27	**Proposal - Full 2nd Draft:** discuss in Jr Groups	*Before previous evening*: provide Jr teammates full 2nd draft of proposal *Bring to class:* marked-up drafts of each other's proposals and (applicable parts of) grading rubric *Before next class:* email me your markups and critiques using Dept rubric
Mon 3/30	**Sr. Presentations 4:15pm** Jr's evaluate with dept rubric	*At end of session:* give me your evaluations
Wed 4/1	**½ Jr Proposal Presentations** (7min) Sr's evaluate with dept rubric	*At end of session:* give me your evaluations
Fri 4/3	**½ Jr Proposal Presentations** (7min) Sr's evaluate with dept rubric	*At end of session:* give me your evaluations *by end of day:* Provide draft of theses to team and *new* Jr "reviewers"; cc research advisor
Mon 4/6	**Sr Thesis – Penultimate Draft:** meet as teams	*Before class:* mark-up your team sr's thesis draft *By end of day:* provide penultimate draft of proposal to team members
Wed 4/8	**Sr Thesis – Penultimate Draft:** meet with "reviewers"	*Before class:* apply dept rubric to "reviewed" sr's draft
Fri 4/10	**Jr Proposal – Penultimate Draft:** meet as teams	*Before class:* have read and marked up proposal drafts
(Thurs April 16 @ Noon) **Final Draft** of Thesis, of Project Proposal		