

Physics Integrative Exercise 2013-2014

1 Overview

The Physics Integrative Exercise, a.k.a. Comps, is the culmination of all the hard work you have done during your time at Carleton. This document will serve as your reference manual for the exercise. It includes descriptions of all elements of your project and the deadlines associated with them.

The first part of your assignment for comps is to choose three possible topics within (or related to) physics, that will meet the College and Department requirements for the integrative exercise. Then you will hone in on one of them and independently research it using existing literature.¹ You are required to present a 60 minute talk and write a 7500 word paper on your topic. You are also required to write an introductory paper on your topic that will be distributed to members of the department before your talk and an abstract written for a general audience (think intro physics students). Each student participating in comps will peer review another student's written paper twice during the process. Each student will also write two "reaction papers," analyzing the talks of two other students. Specific details of each of these components follow; and *all deadlines are summarized on the final page.*

It is crucial that you meet the deadlines for each of these things as you move through the comps process. You will be evaluated on your performance in each of these areas, including meeting deadlines, and your grade will be assigned accordingly.

2 Assignments

2.1 Fall Assignments: Choosing a Topic and Meeting With Your Advisor

The first step in a successful comps project is the selection of a good topic. First and foremost, the topic should be of interest to you. Comps will require a significant amount of work on your part, and you will have more motivation to complete that work if you are interested in learning about the topic. Your topic needs to be narrow enough that you can address it with adequate depth, but at the same time broad enough that includes a range of themes from the standard physics curriculum (E&M, quantum mechanics, thermodynamics, classical mechanics, optics, etc.). Think about this balance when considering potential topics. If your topic is too narrow, it will likely not be integrative. If your topic is too broad, you will likely not be able present your topic at the level expected of a senior physics major within the length constraints of the paper. To get a feel for this balance and to see what people have done in the past, consult the final written papers of previous students. These are available outside the main Department Office (Olin 331) and in the Library.

Current areas of physics research, physics applied to outside or everyday things, historical aspects of physics, and physics applied to societal issues are all areas where people have drawn ideas for topics. If you are having trouble finding a focus for an idea, think of asking a question that your comps will answer. For example, What role do phonons play in superconductivity? As you consider topics, discuss your ideas with at least two faculty members.

There are two assignments during fall term. The first, due Friday, October 18, is a list of a minimum of three topics which you are considering. Even if you have a topic you have decided upon, you must submit a minimum of three topics. For each topic, state why you would like to investigate this topic and any questions you would like to answer. The second, due Thursday, October 31, is a one page proposal for your specific topic. The proposal should explain why you think this topic is interesting, how it is integrative, and list resources that you have identified. If you have any questions that you would like to answer, you should list those as well. See §3.3 for details on preferences that you can request at these times.

You must then meet with your advisor by November 20 (last day of classes) to discuss your project and plans. Before this meeting, please consult go.carleton.edu/integrity to review Carleton's Academic Integrity policy. Be sure you understand what plagiarism is and how to correctly cite others work. This meeting with your advisor would be a good time to address any questions you may have about academic integrity.

¹In addition to the results of your library research, you may also include original experimental or theoretical work.

2.2 Main Paper

The main text of the paper is to be no more than 7500 words. You must include a word count when you submit *each version* of your paper. The word count does not include footnotes, appendices, the bibliography and similar items. All appendices together must be five pages or less. The form of the paper should follow the guidelines on the “Style Manual” portion of the comps website.²

The paper that you submit *at each stage* should be in “publication” form. The first version should be electronically submitted *in PDF format* to Trenne Fields three weeks before your talk. This **first version** is *not* a **first draft**. It should be a polished paper free of typos and grammar mistakes. Read and reread the first version and tweak appropriately. You are required to include the first version checklist (available on the comps website²) when you submit your paper. Your paper will not be accepted unless you have completed all items on the checklist. Your advisor and peer advisor will read the first version of your paper. Within a week of submitting your paper you will meet with your advisor and peer advisor (at the same time) to receive feedback on your paper. Following this meeting you should discuss your plan for your talk with your advisor. Two weeks after your talk, your second version of the paper is due *in PDF format* to Trenne Fields (include the second version checklist). The second version of the paper should incorporate suggestions and comments from your advisor and peer advisor and be a very refined piece of work. A week after submitting your second version you will meet with your advisor and peer advisor together to receive feedback. You will also meet with your second faculty advisor for additional feedback. The third and final version of your paper is due five weeks after your talk. Email this version *in PDF format* to Trenne Fields. This version should be of “archival” quality. It will be evaluated by your faculty advisors and then bound into a volume for the department and library archives.

It is crucial that you honor the deadlines for your paper. This is necessary to give your readers adequate time to provide thoughtful feedback as well as keeping you track to finish on schedule. If you submit your paper late, serious consequences may result.

2.3 Peer Review

Each person participating in comps will be assigned to peer review the first and second paper versions of another student. You should read these papers carefully and be prepared to provide constructive feedback to the author of the paper. You will meet with the author at the same time as they meet with their primary faculty advisor. Being a peer reviewer is part of the comps process and your performance will be evaluated and considered when assigning your final grade for comps. Note that “Peer Review” is not to be confused with “Reaction Paper.” (See §2.6 for the latter.)

2.4 Introductory Paper and General Publicity Abstract

The purpose of the introductory paper is to prepare your audience for your talk. It should include a brief synopsis of what will be included in your talk. You may wish to include background or historical information that is important but you do not have time to cover in your talk. Another possibility is to present mathematics or derivations that are not appropriate for oral presentation.

In most cases, the introductory paper will be derived from the introduction of your main paper. Just because something is included in your introductory paper does not mean that it should be completely omitted from your talk. Your talk should have a complete continuous narrative. The introductory paper allows you to shorten the time you spend on some topics during your talk. Be sure to read the introductory papers of other people before you attend their talks. The introductory paper is due *in PDF format* to Trenne Fields one week before your talk.

At the same time you submit your Introductory Paper, you should also submit an abstract of your talk written at a level for a general audience. In this context, general audience refers to a student in an introductory physics class. The abstract will be published in *Radiations*, posted on the Comps bulletin board outside the main department office, and sent to all Comps students.

²<http://apps.carleton.edu/curricular/physics/Curriculum/comps>

2.5 Talk

The centerpiece of comps is a 60 minute oral presentation. You should plan to talk for 50 minutes and leave 10 minutes for questions. Your talk should have a logical narrative that your audience can follow. It is your job as a speaker to keep them engaged in this narrative while clearly communicating content. The level of your talk should be aimed at your fellow senior physics majors who have a solid foundation in physics but are not experts in your exact topic. General audience members should be able to follow most of your talk, however they may not have the adequate background to absorb all of the physics. This is OK. You need to strike a balance between all members of the audience.

The point of the talk is to clearly and effectively communicate your topic to the audience. This requires carefully planning and practice. A common mistake is to cover too much material. Your talk will likely cover less than your paper. Carefully plan your use of the white board and visual aids. You should also practice giving your talk to an audience of sympathetic listeners, such as your fellow comps students. This will give you a sense of the length of your talk and how to improve clarity. Plan some flexibility in your talk in case you go over or under time.

A tradition has evolved wherein the speaker provides *modest* snacks at the talk. Your faculty advisor will bring coffee and tea.

2.6 Reaction Papers

Each person participating in comps will be assigned to write a short two-page double-spaced reaction paper in response to the talks of two peers. The paper should provide careful, thoughtful, sensitive, constructive commentary on your experience as an audience member at the talk. Discuss the strength and weaknesses of the talk, what you liked, what you didn't like, what could be improved and how, etc. The reaction papers are used by faculty members to judge the efficacy of the talk to the speaker's peers. A paper which unconvincingly praises the presentation without showing thought is not helpful.

Following the talk the speaker will meet with their advisor to receive feedback on the talk. Reaction papers contribute to the feedback that a speaker receives from their advisor. This is done completely anonymously and comments are not attributed to individuals. Since this meeting occurs within a few days of the talk, it is crucial that reaction papers be submitted in a timely manner. Reaction papers are due in Trenne Fields' mailbox (sealed in an envelope for confidentiality) within 24 hours of the talk. Note that "Reaction Paper" is not to be confused with "Peer Review." (See §2.3 for the latter.)

2.7 Talk Attendance

You are required to attend at least ten talks besides your own. You may attend talks in any section. Attendance sheets will be passed around during each talk and the onus is on you to sign the attendance sheets so we can record that you attended the required number of talks. *If you do not sign the attendance sheet, you will not receive credit for attending the talk.*

3 Logistics

3.1 Faculty Advisors

You will be assigned one primary faculty advisor and one secondary faculty advisor. The primary advisor will be your main point of contact throughout the process. Your advisor will read your first and second versions of your paper and provide feedback. You will meet with your secondary advisor to receive feedback on the second version of your paper. Immediately after your talk you should arrange a time to meet with your primary advisor to discuss reactions to your talk and future versions of your paper. This meeting should take place within three days of your talk.

In general, your advisor will be available for advice throughout the process. Consult them for advice on things such as preparing an outline and planning your talk among other things.

3.2 Meeting Times

The talks will take place on Mondays at 1A (8:30 – 9:40) and on Wednesdays and Fridays at 6A (W 3:10 – 4:20, F 3:30 – 4:40) during weeks four through ten of winter term.

3.3 Indicating Your Preferences

You have the opportunity to indicate preferences for an advisor, a talk date, and 6A versus 1A. If you have preferences you must indicate them in one of the assignments submitted during fall term, preferably the first assignment due October 18. If you are unable to participate in the 1A or 6A sections you must explicitly explain why (e.g, athletics during 6A or you are taking a 1A course during winter term). The first papers will be due the first day of classes winter term, January 6; the first talk will be January 27.

On November 7 you will be assigned a date for your talk and your primary and secondary faculty advisors. We will do our best to accommodate all requests, but in the end it is likely that not everyone will receive their top choices.

3.4 Evaluation

You will be assigned one of three final grades: pass with distinction, pass, or fail. You will be evaluated on the following:

- Your ability to construct a cohesive narrative in your talk and final paper which is integrative and presented at an appropriate level.
- Your command and understanding of your topic.
- Your general written and oral communication skills.
- Your participation in the comps process as a whole. This includes peer review, reaction papers, talk attendance, asking thoughtful questions at talks, and meeting deadlines.

Approximately equal weight will be given to the oral and written parts of your work. To receive a passing grade both the talk and final paper must meet the minimum standards for passing. To receive distinction, either your talk or paper must be graded as outstanding and the other component graded significantly above the minimum passing level.

4 Final Comments

Writing a 7500 word paper is not a trivial task and will require significant time and effort to complete. Be sure to allow plenty of time to complete and polish your paper at each step. If writing does not come easily to you, do not hesitate to seek help early in the process. The Writing Center is a great resource and they are eager to help you with all aspects of your paper.

It is very important that you meet all deadlines in this process. The deadlines are designed to provide sufficient time to complete tasks and receive evaluation on that work. If you do not meet the deadlines you may not receive adequate feedback or have time to incorporate that feedback. If this happens, the quality of your final product will suffer.

In almost all cases, students find comps to be a worthwhile, interesting, and satisfying undertaking. The faculty agree with this and enjoy seeing the successful result of your work, which often goes beyond the specified requirements of the project. We encourage you to give comps your best effort and discover that you are capable of independently becoming the local expert on your topic.

FALL TERM DEADLINES

Friday, October 18	First Fall assignment is due. This should be submitted to Joel Weisberg via email. Indicate any preferences for advisor and time and date of your talk.
Thursday, October 31	Second Fall assignment is due: a one page proposal for your specific topic. This should be submitted to Joel as a <i>PDF format</i> email attachment. This is your last chance to indicate preferences.
Thursday, November 7	You will be notified of your advisor, enrollment section, and presentation date.
By Wednesday, November 20	Meet with your advisor to discuss your progress, plan for the project and discuss any questions you have regarding academic integrity.

WINTER and SPRING³ TERM DEADLINES

Presentation - 3 weeks	First version of your paper to be emailed to Trenne Fields <i>in PDF format</i> . Include the first version checklist.
Presentation - 2 weeks	Meet with primary and peer advisors to receive feedback on your first version.
Presentation - 1 week	Email introductory paper and general audience abstract to Trenne Fields <i>in PDF format</i> .
Presentation	Your talk will occur sometime between January 27 and March 12.
Presentation + 1 day	Reaction paper (sealed in envelope) due in Trenne's mailbox.
Presentation + 3 days	Conference with primary advisor to discuss oral presentation and your plan going forward.
Presentation + 2 weeks	Second version of your paper to be emailed to Trenne Fields <i>in PDF format</i> . Include the second version checklist.
Presentation + 3 weeks	Meet with primary and peer advisors to receive feedback on your second version. Meet separately with your secondary advisor.
Presentation + 5 weeks	Final version of your paper to be submitted to Trenne Fields as a single PDF file. Name your file: username_YYYY.pdf where YYYY is your graduate year (e.g., jweisber.2014.pdf). Trenne will print your paper for binding.
Before end of spring term	You will receive your final grade for comps.
After receiving a passing grade	Digitally archive your comps at the library website. More information on this to come.

NOTE: Spring Break is not counted in the official comps schedule. If spring break falls in your comps schedule³, you have a little flexibility in your schedule. Talk to your comps advisor.

Be sure to meet all deadlines.

³All *talks* are winter term.