

Objective

The main objective of the PSI essay and defence is for the PSI student to demonstrate an understanding of a problem in theoretical physics at the level of a research paper in the corresponding field. Production of original results is appreciated but not required for a successful outcome.

Timeline

The essay requires an extensive period of time to prepare and complete in proper accordance with the guidelines. Make sure that the timing of its completion is planned ahead of time. You will need to set aside time for your supervisor to read it before submission and time for changes to be made. Having a good plan in advance will help ease some of the stress associated with this project. Regular communication with your mentor on the status of your essay planning and work is highly encouraged.

Note: *if you are considering spending more than one week on the Winter School project you should discuss this with your essay supervisor.*

1. **September–December:** find a supervisor, agree on a project, and submit the signed essay agreement.
2. **December 8:** Deadline for the essay agreement to be handed in. *If you have contacted more than one potential supervisor, make sure to communicate to all of them your final choice.*
3. **January–April:** You will start working on your essay project alongside your coursework. Check in regularly with your supervisor, especially if you feel stuck. Also, the sooner you start writing down notes about your work, the better.
4. **May:** Courses are over, and you have a month left to fully focus on your project *and write your essay*. Start writing as early as possible: you almost certainly underestimate the time it takes to write up your work. The essay should be written at a level accessible by a senior scientist of the same field, but not necessarily expert in your very topic; the introduction should be accessible to other PSI students.
5. **June 3 at 6PM:** The *completed* essay must be handed in, and it will be sent to one external and one internal examiner (typically an Academic Staff member) for review. You will have about a week to entirely focus on preparing their presentation under your supervision. *Note: missing this deadline without justification will lead to you failing the PSI certificate.*
6. **June 10-17:** Essay defences take place.
7. **Two days after your defence:** You must submit a final, revised version of the essay.
8. **June 21:** Graduation ceremony.

Essay Guidelines

- **Formatting:** The essay should be written using the LaTeX zip file template that will be provided to you. This can be added and edited in Overleaf (this is encouraged because it will simplify your final submission). The submitted essay's filename must be: **PSI Essay 2024** (your name will be added automatically upon submission).
- **Length:** Each student must submit an essay of **30 pages or fewer** (not including front matter, acknowledgements, references, and appendices). In cases where a student includes additional technical details (or content beyond 30 pages) in appendices, the examiners *will not be required* to read this material.
- **Statement of original research:** Each student must include within the essay's introduction a summary of which sections (if any) contain original research. Ensure that your statement follows the format of the template that has been provided.
- **Climate impact statement:** Students are encouraged to include a climate impact statement in their essays (see here for an example). Instructions will be provided in the essay LaTeX template.
- **Pre-defence submission guidelines:** Each student must submit an electronic PDF copy of the essay to the designated Dropbox folder. The link for the folder will be provided to you. The essay's filename must be: **PSI Essay 2024** (your name will be added automatically upon submission). The essays will then be made available to each student's assigned examiners (typically one Academic Staff member and one external examiner).
- **Post-defence submission guidelines:** Two days after your defence you must submit the final, revised version of your essay. **This will be done by sharing with us your Overleaf project** in a way that will be communicated to you. Ensure that the link provided includes *editing privileges* (this allows us to change some minor formatting for the essay collection, if necessary). This version will be placed in the PSI essay collection.

Essay Defence

- **Defence committee:** The examination committee will include the student's supervisor(s), an Academic Staff member (chair), as well as an invited researcher external to PSI. Students will be notified of the full examination committees at least one week prior to the presentations.
- **Defence presentation:** You must give a presentation strictly limited to **20 minutes**, with about half of the content accessible to PSI students who have taken the relevant PSI courses. The presentation should address how the research in the essay (whether original or reviewed) is relevant and exciting to physics researchers *outside of your field*. The presentation does not need to cover all content from the essay.
- **Question and discussion period:** After the presentation, you will answer questions from the audience followed by approximately 20 minutes of questions from an examination committee. You should be prepared to answer questions related to the content of both the essay and the presentation. The examiners may interrupt the presentation to ask questions of clarification.

Student presentation	20 minutes
Question period	20–25 minutes (Up to 5 minutes from audience members followed by up to 5 minutes per examiner, starting with the external examiner and ending with the supervisor(s))
Examination committee discussion session	15 minutes
Feedback to student	5 minutes

Feedback and resubmission

Following the presentation, the student and audience members will leave the room and the examination committee will determine a ranking for the essay and defence from the following categories:

1. **Unconditionally accepted:** the essay and defence both meet the objective. In this case, the student is not required to submit a revised version of the essay (although the student may still choose to submit revisions within two days of the defence).
2. **Conditionally accepted:** the committee determines that the student must satisfy a set of conditions in order to meet the objective. These conditions must be satisfied within two days of the defence. If 2 days are not enough to implement the required changes, then the essay is considered as Not Accepted.
3. **Not accepted for PSI certificate:** the essay and/or defence do not meet the objective. In this case, faculty members from the University of Waterloo will determine whether the essay meets the research paper requirements for the coursework Master’s degree. *Note: unjustified delays in the submission of the essay will lead to failing the PSI certificate. If any issue arises, please promptly contact the Academic Staff.*

After the examiners’ discussions, the student will return to the room to receive the ranking as well as feedback from the examination committee. If you would like to receive written feedback after your defence, you must request this from the Academic Staff member or the Academic Programs Manager who are in charge of the defences.

Regarding the resubmission guidelines, see the “Essay Guidelines” section above.

Academic Integrity

For the essay and the defence presentation, all students are expected to know, understand, and follow the academic integrity policies detailed on the University of Waterloo Academic Integrity website (<https://uwaterloo.ca/academic-integrity/>). In particular, if an essay or defence includes discussion of a collaborator’s work, the work must be properly cited or quoted.

The essay may not include any work previously submitted for another degree. The essay may include work that the student submitted for publication or posted on arXiv. (It is recommended to receive feedback on the essay before submitting the work for publication or to arXiv.)