

GUIDELINES FOR PHYSICAL CHEMISTRY ADVANCEMENT-TO-CANDIDACY EXAM

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GENERAL

Although it is tempting to view the various degree requirements as hurdles standing between where you are and where you would like to be, the faculty believes that they exist to help you develop your scientific skills. This is especially true of the advancement to candidacy process. After class work, research and writing a thesis, the Advancement exam is probably the most time consuming requirement of the chemistry PhD program. It is not simply an administrative barrier between you and the Ph.D. It is a valuable experience to develop your scientific knowledge and communication skills. We hope that this document will both make the procedures clear and help you prepare for the exam with confidence. **The oral exam is usually the last step in the “Advancement to Candidacy.” Note that once you have completed this Advancement, you are expected to complete your thesis defense within nine academic quarters.**

THE EXAM AND YOUR COMMITTEE

- The advancement-to-candidacy exam requires the submission of two written documents, an *original proposal* and a *summary of research accomplished*, and preparation of two oral presentations. The examination takes place during the oral presentation, and is conducted by a committee composed of four Chemistry Department faculty members and an additional UCI faculty member from outside the Department of Chemistry. The exam is not open to anyone else. It usually lasts two hours.
- The committee members from the Chemistry Department are assigned to you by the physical chemistry student advisor (currently Prof. Potma) before your fourth quarter of residence. The student’s research advisor is not permitted to be a member of the student’s committee.

- It is your responsibility to select the outside committee member and **report his/her name and contact details to Jenny Du before the examination period (also see, “original research proposal,” below)**. If possible, the outside member should be chosen with either your proposal or research topic in mind. Professors affiliated with other departments in the School of Physical Sciences and in other Schools are eligible. By the UCI rules, the committee members **must be voting members of the University of California Academic Senate** (this applies to most professors at UCI, but we had cases when the outside members picked by the students were not eligible for participation on the committee, please confirm with the academic advisor if in doubt). The outside member cannot have any formal affiliation with the Department of Chemistry. For example, none of the professors with joint appointments – Gorodetsky, Hanessian, Ho, Hochbaum, Luptak, Mobley, Poulos, Ribbe, Siwy, Tsai and Yee - can be outside members. You should be in contact with your outside committee member before the exam to avoid potential time conflicts.

SCHEDULING AND DEADLINES

- You need to have your original research proposal topic approved by your committee chair several months before the oral exam date (see next section for more details).
- All analytical, atmospheric, biophysical, physical and theoretical chemistry graduate students must take their oral exam during the *seventh* quarter in residence at UCI, excluding summers. You should be ready to present your oral exam in early November of your 3rd year. The same requirement applies to students who started in the ChaMP program, but elected to switch to another track.
- All ChaMP graduate students affiliated with the Chemistry Department must take their oral exam during the first half of their *ninth* quarter in residence. You should expect to present your oral exam in early April of your 3rd year.
- For most students the oral exam dates will be scheduled by the physical chemistry student advisor. If you **and your research advisor** agree that you should take the exam early, you will be responsible for scheduling the exam yourself. **If you choose to do this, note that once you have completed the advancement to candidacy, you are expected to complete your thesis defense within nine academic year quarters (three calendar years).** At the same time, permission to take the exam late will only be granted in exceptional circumstances. These measures are in place to prevent students from staying in graduate school for too long.
- Please see Tenley Dunn one month prior to the anticipated date of your exam to complete the required paper work. **And also please see her at least 24 hours prior to the anticipated date of your exam, she will provide you with forms your committee needs to sign on the day of your examination.** Although the Chemistry graduate affairs office is available for advice and assistance, remember that **meeting deadlines and completion of the paperwork is YOUR responsibility.**

THE ORIGINAL RESEARCH PROPOSAL

- The proposal should demonstrate your originality, imagination, broad knowledge, and thorough preparation. It must be in an area unrelated to your past and present research, and, to that of your past and present research advisor(s). Although the development of the research proposal is expected to be your own independent effort, your research advisor or committee chair may help you with specific questions.
- You should submit a 1-2 page abstract of your proposal to the chair of your exam committee no later than two months prior to the expected date of the exam. *Your exam committee chair makes the final decision as to whether your proposal is acceptable.* Therefore, it is important to talk with your chair several months before the exam date to determine whether your topic is acceptable. Do not wait until the last moment. Obtaining the committee approval well in advance will ensure that your topic is sufficiently novel and clearly distinct from your thesis research. Refer to the following table for more specific deadlines:

Students	Abstract due	Exam date
Physical, analytical, atmospheric, biophysical, and theoretical students	End of August	Early November during the 7 th quarter
ChaMP chemistry students	End of January	Early April during the 9 th quarter

- The abstract should clearly and concisely explain your original proposal topic (vague abstracts will be rejected by the committee). You should include critical references in the abstracts, with titles. Together with your original proposal abstract, submit a brief description (abstract) of your current research to let the committee assess the degree of overlap between your original proposal and your research.
- The chair will discuss your abstract with the other committee members and either accept or reject it. If your abstract is approved, have the committee chair sign the abstract, to document its approval. **Submit the signed abstract to Tenley Dunn and if Prof. Potma is not on your committee, send an electronic copy to Professor Potma.**
- **The outside member should be picked by the student as soon as the original proposal abstract is approved by the committee. The name and e-mail of the outside member should be sent to Jenny Du (juand@uci.edu) before the exam period.**

THE WRITTEN PROPOSAL AND PROGRESS REPORT

- The written proposal should provide a clear and concise outline of the research problem and a description of how you intend to approach it. Your objective in the written document, and in the oral presentation during the exam, is to convince the committee that the project you propose is both feasible and important. **Note that part of your exam score will come from the quality of your written documents, including the correct formatting.** The written original proposal should follow this format (*the suggested number of pages for each section corresponds to the line spacing of 1.5*):
 - I) **Title Page** (1 page; does not count towards the page limit).

- II) **Abstract** (1 page; does not count towards the page limit). This should be a shorter version of the initially approved abstract, and it should not include references (the references you included in your initially approved abstract will now go into the main part of the document).
 - III) **Background and Significance** (≈ 4 pages). Describe the problem, placing it in the context of other research.
 - IV) **Proposal** (≈ 8 pages) Describe how you intend to solve the problem. Often, a feasibility analysis is important. Also, some discussion of why the proposed technique was chosen over possible alternatives is important. Most important of all is to convince the committee that the work proposed would solve the stated problem.
 - V) **Bibliography and Notes** (≈ 3 pages). All references must include titles, in addition to the author names, journal, volume, year, and page.
- The research progress report should provide a clear and concise record of your work to date, its place within a scientific context, and your expected follow-on work to obtain the Ph.D. The format of the written progress report is slightly altered from the original proposal (it resembles a draft for a journal publication). Once again, the suggested number of pages for each section corresponds to the line spacing of 1.5.
 - I) **Title Page** (1 page; does not count towards the page limit).
 - II) **Abstract** (1 page; does not count towards the page limit).
 - III) **Background and Significance** (≈ 3 pages). Describe your thesis research, placing it in the proper context.
 - IV) **Research Progress** (≈ 7 pages). Describe work performed, results obtained, their significance and interpretation. Be sure to support your writing with suitable images and/or tables of critical data placed in the text.
 - V) **Future work** (≈ 2 pages). What you expect to complete before you defend your Ph.D. thesis.
 - VI) **Bibliography and Notes** (≈ 3 pages). All references must include titles, in addition to the author names, journal, volume, year, and page.
 - VII) **Your CV** (2 pages; does not count towards the page limit)
 - VII) **Timeline to your PhD**. Include a table with a summary of tasks to be completed and deadlines for these tasks (1 page; does not count towards the page limit). Include the same table in the end of your oral presentation. Be sure to review this table with your advisor.
 - VII) **Optional Appendix**: If your report makes extensive reference to a paper you co-authored, you may attach it in the appendix (does not count towards the page limit). Please do not attach papers that are submitted or under review; do not attach more than one paper.
 - The lengths of different parts given above are suggestions, not requirements. However, excluding abstract, title page, CV, and timeline, **each document should be no longer than 15 pages, 1.5-spaced (or 10 pages single-spaced) with all figures incorporated into the text**. Each page should have a 1" (2.5 cm) margin on all edges. If you have a

long bibliography because of the high level of research activity in your field, it can extend beyond the above page limit. **Use an easily legible font such as Times New Roman or Palatino, 12-point font size.**

- Pay careful attention to spelling, grammar, punctuation and style. You are being examined on communication skills as well as on science. The committee will use your proposals to evaluate your ability to write independent papers, and ultimately your PhD thesis.
- **Every graph or table taken from other sources and reproduced in your document should be properly cited.**
- Make sure that all your graphs are large enough to be visible (many students put microscopic graphics in their reports), have a full caption, clearly labeled axes, axis titles, etc.
- Perhaps, the single most common reason for failing an exam is plagiarism. This is painful and highly embarrassing for both the student and the committee. Any time you state an idea or concept as your own, but it is really someone else's, this constitutes plagiarism. You should have discussed this topic in the Chem 200 course, and the description below is not exhaustive.
 - Statements, diagrams or pictures lifted from the literature or from the web and inserted into your report or PowerPoint presentation without proper use of quotation marks and explicit attribution are obvious examples of plagiarism. In general, faculty members are quite efficient at detecting this form of plagiarism, and chances are high that if you have done this you will not pass the exam. (When you actually publish your work, borrowing paragraph or figure from another paper also requires that you obtain permission from the original author to avoid infringing on the copyright.)
 - Learning something in the literature and then re-explaining it with new words, without attribution, is also plagiarism. In a way this is worse, since it looks like the perpetrator has explicitly tried to obscure the origin of an idea. So, when in doubt, always give a reference. Of course, for an equation like $F = ma$, one rarely gives the exact original source. In that case, a phrase like: "It is common knowledge that..." will suffice.
 - Copying paragraphs or extended passages of text from other sources and inserting them in your reports after minor modifications will result in a definite fail, even if you cite the sources.
 - When preparing your research progress report, you must summarize your research progress in your own words. If you already have a paper that you co-authored, you may not copy passages from this paper and paste them in the progress report. You must synopsise in your own words, but can refer to and/or attach the paper as an appendix.
- **The written documents should be submitted to your committee members no later than one week prior to the oral exam date.** In addition to providing the committee

members with printed version these documents, submit an electronic version of your proposal to the physical chemistry student advisor (Prof. Potma).

ACTUAL EXAM

No matter how good you are in the laboratory, your professional prospects are strongly affected by your ability to communicate the motivation, significance, and quality of your work to others through your written and oral presentations. The oral exam is a valuable opportunity to practice in front of an experienced and helpful audience, and to share your enthusiasm for your work and for science in general. Take advantage of this opportunity! You may be asking committee members for letters of reference in the future, the exam can be useful to establish a longer-term professional relationship with one or more faculty members other than your advisor. This is what you can expect to happen before and during an exam:

- The date and time of your exam will be scheduled for you. However, do not rely on your committee members to remember these details. **Send everyone, including your outside member, a reminder** about the location and time of your exam several days ahead of time.
- Please **arrive at least 20-30 min ahead of time**. A number of emergencies such as broken projector, missing adapter, uncooperating laptop, missing VGA cable, locked room, etc. routinely arise. You will be creating a very bad impression of your organizational skills if your committee has to sit and wait for you to get your presentation going. Every minute you spend on that will cut your exam short, and you will be at a disadvantage if you do not have enough time to finish your presentation.
- **Bring exam paperwork with you**. You can get it from Tenley Dunn.
- It is also recommended that you bring dry-erase markers to write on the board – not all rooms have them.
- You may not bring any food or drink items for the committee members to the exam. Committee members sometimes bring food themselves, this is allowed.
- At the beginning of an exam, it is common for the committee to ask you to step out of the room for a brief closed discussion. Most committees request that you start the exam with the original proposal, and then proceed to the research report. Sometimes the first question you get from the committee is a request to tell them about yourself.
- The normal duration of the exam is two hours. You should prepare an oral presentation of **20 minutes** on each topic. The presentation is very much like a seminar or group meeting, except that it will be interrupted frequently by questions from the committee members. The presentations should contain information similar to your written reports but have more graphics and less text in them. You can fully expect that questioning will add another 40 minutes per part. Therefore do not prepare more than **15-20 slides**. A lot of students make a mistake of preparing 40-50 slide presentations. They invariably run out of time before they reach the middle of their presentation - do not repeat this rather common mistake. Think very carefully about what to include on your slides (committee members might be asking questions about anything in your slide, so add only the most

pertinent information). It is highly recommended that you rehearse your presentation in front of a group multiple times and ask them to be very aggressive with their questions.

- The exam is intended to test not only your knowledge and understanding of your proposal and thesis research, but also your underlying knowledge and understanding of chemistry. So, the questions may also cover basic concepts and research not referred to in your written report. Students are often asked to solve simple chemistry (e.g., drawing Lewis structures) and equations (e.g., converting units from Torr or Pa) on the board. Also, remember that there is a non-chemist on the committee. Be prepared to answer, in non-technical terms, such questions as: "Why is this research worth doing?" or "What will you learn from it?"
- At the end of the exam you will be asked to step out for a 10-20 min closed discussion by your committee. After that, the committee will invite you back in and inform you of their decision. In some case the final decision may be delayed by 1-2 weeks, refer to the guidelines for the faculty members to better understand the process.

WHAT CAN LEAD TO A FAIL?

The most common reasons for failing the exam have historically been:

- Not meeting the deadlines described in this document. (Having no approved abstract one month before the exam date, or written reports one week before the exam date, you will get an automatic fail.)
- Poor quality of the presentations and/or written reports (be sure to practice your presentations several times with a critical audience, and have your lab mates read your proposal).
- Inability to answer a large fraction of questions by the committee members.
- Lack of basic knowledge in the area of your original proposal topic.
- Evidence of poor knowledge of research literature in your own research topic.
- Failure to fulfill the requirement of the provisional pass (see below).
- Compelling evidence for plagiarism.

If you fail the exam, the rules make it possible to take it again within one year.

The committee may elect to give you a provisional pass, which means passing you if you fulfill an additional assignment. Examples from the past included re-writing one of the reports, doing one of the presentations over, and addressing unresolved questions about one of the reports in written form. The committee will determine the type of the assignment and the associated deadlines. More information on provisional passes can be found in guidelines for the faculty – you will get a copy of that document too.

SUMMARY OF EXAM DATE BY ENTERING CLASS

Students starting in year:	Will pass the exam in academic year:
2012	2014-15
2013	2015-16
2014	2016-17
2015	2017-18
2016	2018-19
Etc.	Etc.

EXTENSIONS

The deadlines can be adjusted by the pchem academic advisor (Prof. Potma) under special circumstances. Please discuss your situation with the advisor if any of the following applies to you:

- You experienced significant delays due to serious health-related issues (recovery from an operation, prolonged treatment, etc.) in the 1st or 2nd year of graduate school.
- You took an official leave of absence for a significant fraction of the 1st or 2nd year of graduate school.
- You switched research groups during or after winter quarter of your 2nd year of graduate school.

SUMMARY OF IMPORTANT DATES AND DEADLINES

	Must be completed by:	
	<i>Non-ChaMP</i>	<i>ChaMP</i>
Oral committee assignments	4 th quarter in residence (July)	
Meet your committee chair	4 months before the exam (June)	4 months before the exam (December)
Remind committee members of the November exam dates	2 months before the exam (August)	2 months before the exam (January)
Find an outside committee member and send his/her name and e-mail to Jenny Du (juand@uci.edu).	2 months before the exam (August)	2 months before the exam (January)
Submit your original project abstract to the committee	2 months before the exam (August)	2 months before the exam (January)
Send your proposals to the entire committee (and to the pchem area advisor)	1 week before the exam	
Oral exam date	7 th quarter in residence (early November)	9 th quarter in residence (early April)