

*Students entering the Ph.D. program during or after Fall 2013 must pass a series of Cumulative Examinations, as detailed in this document.*

The goal of the Chemistry Faculty is to help you become professional chemists, with all the privileges and responsibilities that entails. As early stage chemistry graduate students, many of your learning experiences thus far have been passive — i.e., your chemistry knowledge has been assimilated from lectures and readings on subjects that have been selected for you because of their importance to the field. Your knowledge was then tested by examination within the boundaries of those classes. As someone who now aspires to become a professional chemist, your learning must now be active, cumulative (hence the name of the examinations), and lifelong. There are many reasons for this, but the most basic one is that it is expected that a professional chemist is knowledgeable about the latest advances in his/her field. It is also the starting point for other skills that you will eventually need to develop to become a successful Ph.D. candidate such as:

- Learning how to frame questions that will lead to important scientific discoveries;
- Taking ownership of your research project by designing experiments to produce data that enable you to develop clear interpretations and conclusions;
- Anticipating difficulties that will be encountered in your research plan and develop strategies to work around them;
- Having the courage, determination and resourcefulness to solve the inevitable unanticipated problems that do arise;
- Developing effective presentation skills to convince a critical audience of the veracity of your scientific findings & conclusions;
- Participating in presentations made by other scientists through active listening, critical analysis and thoughtful questioning; and,
- Writing and defending an original body of scientific work in the form of a Ph.D. dissertation

The cumulative exams are intended to serve as a mechanism to encourage and assess your progress toward the development of active & cumulative learning skills that are key to the process of becoming a creative, productive, critically thinking and independent scientist. The graduate faculty in Chemistry have determined that these skills are most readily honed by thoughtful and regular reading of primary sources that publish articles on chemistry-related topics.

**Cumulative Examination Topics:** To promote the goal of active and cumulative learning, Cumulative Examinations (or “cumes”) will be predominantly based on material concerning contemporary research topics and practices. In many cases, questions will be derived from primary chemistry-relevant research articles that have appeared within one year of the cume exam date. You are not expected to memorize the details of all the articles published during that period to prepare for a cume exam. Rather, the task for you is to apply your accumulated knowledge of chemical reaction principles and analysis to the articles you read each week and to self-teach in areas where your knowledge is deficient. Continuous cultivation of these good learning habits will deepen your understanding of chemistry, aid in your understanding of seminars (where you often encounter new material that you must analyze in real time using your understanding of chemical principles), and help you develop thoughtful responses to cume exam questions based on this accumulated and growing knowledge base.

**Preparation for Exams:** The cumulative exams are written by the faculty on a rotating basis, and examine general knowledge in each area of chemistry, including recent developments as reported in the current literature and in Departmental Seminars. To help students with their preparations for these exams, the cumulative examiner may elect to announce via the department office (two weeks before the exam) one or more of the following:

- specific topics
- selected journals
- recent seminar subjects

However, if a faculty member does write a question on the subject of a recent seminar, the faculty member must provide enough information so that students whose TA responsibilities prevented attendance at the seminar do not suffer any disadvantage. The identity of the cumulative examiner will remain confidential until after the examination session. At that point, students are free to discuss the exam and its contents.

**Pass/Fail Policy:** Each student must pass five written "cumulative" examination questions within their first four semesters or twelve exam attempts (whichever comes first). To pass an exam, the student must receive a grade of A or B; however, a grade of C will be paired with a grade of A to yield two "passes."

**Cumulative Examination Schedule:** The cumulative exams are administered on the first Saturday of each month (unless otherwise noted), September through December, and February through May, totaling eight exams each academic year. At each session, four exams are available (in biological, organic, inorganic, and physical chemistry), and you are free to choose one or more exam(s) to take during that session. Although you need only take one exam per session, you are welcome to attempt more than one exam during the 120-minute examination period – each session counts as one attempt, not each individual exam you may choose to take in each session. Note, however, that at least three (3) of the five (5) cumulative exams that you pass to satisfy the requirement must be in your principal area of study, and no more than four (4) exam passes may come from a single author.

Ph.D. students entering the program without a master's degree in Chemistry are free to begin taking cumulative exams immediately upon matriculating in the department, but they are **required** to begin no later than (the start of) their second semester in residence. It is to the student's advantage to begin early – in any case, the twelve (12) attempt clock does not begin until the first seating in the second semester in residence. Ph.D. students with a master's degree in Chemistry are required to begin taking cumulative exams immediately upon matriculating in the program and their 12-attempt clock begins immediately.

Once a student's 12-attempt clock has begun, the student must sit each month they are in residence until they have passed five (5) exams – a missed exam seating counts as a 'fail' except in cases of severe exigency (i.e. a documented illness or medical issue, or other unavoidable scheduling conflict that is discussed with the Graduate Committee Chair or Department Chair *prior* to the exam seating).

**Petition for Extension:** In exceptional circumstances, a student may petition the Graduate Committee for a one-semester extension (providing four additional attempts) in order to pass the five (5) required examinations. In any case, if a Ph.D. student reaches their final attempt without acquiring five (5) passes, they may petition the Graduate Committee to matriculate as a master's student.



**FROM TH, Feb 4 2015. Amendment.**

**To be added at the end of the Pass/Fail section:**

When such score conversions occur, the two exams in question must be from the same of the four areas in which exams are offered.

**In a message to the students the following examples will be given:**

Student 1 has an "A" in PChem and a "C" in PChem. These two scores can be combined for two "Pass" scores.

Student 2 has an "A" in PChem and a "C" in Inorganic. These scores cannot be combined for two "Pass" scores. The student would have to earn an "A" grade in an Inorganic exam.