

PhD Students: Out-of-Field Research Proposal

PURPOSE: The student is expected to evaluate the paper critically, explain it fully, and explain any limitations or flaws, from the premise of the work (context, goals, hypotheses, significance), through experimental or theoretical data collection, results, interpretation of data, and conclusions.

The purpose of the OFRP is fulfilled when the PhD candidates demonstrate that they:

- a. An *in depth* understanding of the chosen paper – a paper in chemical literature that is outside the student’s immediate thesis research field;
- b. An understanding of the broader context of such papers;
- c. The ability to reason analytically and critically, and interpret data properly, in the context of the paper;
- d. The ability to independently formulate well-designed experiments or theory as a continuation of the work described in the paper.

Demonstration of these abilities, even in the context of work close to, but outside of the student’s immediate thesis research field (defined as the “research conducted in the laboratory of the student’s thesis adviser”), comprises a reasonable standard for a second-year graduate student.

The OFRP committee will challenge the student’s interpretation of data and conclusions in the paper, as in a thesis defense, as well as the student’s choice and design of experiments proposed to extend the work (What could have been an alternative approach? Why wouldn’t approach X have worked, instead of approach Y? What if the results of the experiment proposed by the student were not as expected?). The student must defend the work and conclusions as if they were the student’s own – or initially point out any flaws or limitations.

The purpose of the OFRP does NOT necessarily include learning in depth about a field of chemistry entirely outside that of the student’s major field, in addition to the above requirement. Therefore, a student may choose a paper within the same sub-field of chemistry as their thesis research, but outside of the student’s immediate thesis research field (defined as the “research conducted in the laboratory of the student’s thesis adviser”).

The following sub-fields are examples for purposes of illustration: bioinorganic chemistry, bioorganic chemistry, biophysical chemistry, nano-chemistry, nucleic acid chemistry, organometallic chemistry, polymer chemistry, solid-state chemistry, structural biology, supramolecular chemistry, surface chemistry.

REQUIREMENTS: The OFRP consists of written and oral components. The written component will be ~1500 words (2000 word maximum). The oral presentation should last 25-35 minutes. Both components of the OFRP have three parts:

- a. A description of the chosen paper (~500 words) must outline the background, context, reported data, and conclusions drawn by the authors. The student must be able to fully explain the justification for the conclusions, and comment independently on any flaws or limitations.
- b. The aims and significance of the proposed research (~500 words) must outline the question(s) being addressed by the proposed experiments or theory, what hypothesis is being tested (e.g. a new design, a solution to a specific problem, or a challenge to an existing paradigm). The significance should clearly outline the importance of these aims (i.e. the context of the proposal).
- c. The research design (~500 words) must describe the proposed research and analyses to be used to accomplish the aims of the experiments. This section should include a description of (i) how the data will be collected, analyzed, and interpreted; (ii) the advantage(s) of any new method, strategy, approach, or system, to be used; and (iii) the potential difficulties and limitations of the proposed procedures (alternative approaches should be outlined, in the event such difficulties prohibit realization of the aims).

The proposal should be focused and should present relevant detail towards a specific goal rather than several loosely connected ideas and general approaches. It is the student's responsibility to meet deadlines of OFRP, especially:

- The written proposal must be submitted to the OFRP committee at least two weeks prior to the presentation and include the sections described above: (a) description of the chosen paper; (b) the aims and significance of the proposed research; and (c) the research design. Figures should be small and kept to a minimum. References cited should be included on a separate page.
- A PowerPoint presentation (or similar file) must be submitted to the OFRP committee at least one week prior to the presentation. Description of the chosen paper should constitute 50% of the presentation with the remaining 50% covering aims/significance of the proposed research and research design. In contrast to the written proposal, the oral presentation should be rich in figures and contain little text. Key references should be cited on the relevant slide.

PAPER SELECTION: The student will present a paper from Journal of the American Chemical Society (or a comparable paper/journal with the OFRP committee's permission) on the web no

more than 6 weeks prior to the date of the OFRP and will propose an original research project based on this paper. The student's advisor and full OFRP committee (611 instructor and advisory committee members) must approve of the paper choice.

GRADING: OFRP grades of Pass, Low Pass, and Fail will be assigned by the OFRP committee. B and above will be considered passing; grades of C/C+ will be considered a low pass; any grade below this will be failing. A student who fails the OFRP must meet with the committee as soon as possible to decide how to proceed. Grades of High Pass (A+) will only be given in extraordinary cases.

Letter grades for the course within which the OFRP is presented will be based in large part, but generally not exclusively on, the OFRP grade and assigned by the OFRP instructor.

The student's thesis committee will have access to, and will take into consideration, the OFRP grade when considering whether to admit the student to candidacy for the PhD degree.