

## On the Evaluation of Operations Research Ph.D. Students

These are the opinions of R. Pasupathy and S. R. Hunter, which are based in part on conversations with B. Schmeiser.

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If you have comments / suggestions, please email [susanhunter@purdue.edu](mailto:susanhunter@purdue.edu).

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### 1. THERE ARE THREE PRIMARY AREAS OF COMPETENCE FOR PH.D. STUDENTS:

- Having the idea (synthesizing):
  - Is the student able to independently generate creative and impactful ideas?
  - Is the student capable of formulating a rigorous problem statement?
- Pursuing the idea (formalizing):
  - Does the student have adequate mathematical prowess for rigorous expression? Can the student rigorously formulate theorems and carry through with the mathematics required to complete the proof?
- Expressing the idea (communicating):
  - Is the student able to communicate ideas with written word (papers, prelim document, dissertation document) and spoken word (talks, teaching)?

At a minimum, graduating students should be adequately competent in all three areas. Strong students will be competent in all three areas and excel in at least one area.

While Ph.D. students' competence in each area is subjectively determined by the committee at each milestone, there are some experiences (listed below) that ensure students are having adequate growth opportunities. (Note that collecting all the experiences does not, in and of itself, constitute demonstration of competence by the student.)

### 2. EXPERIENCES FOR PH.D. STUDENTS BEFORE THE PRELIMINARY EXAM:

- Have one technical chapter of the dissertation thesis near completion, which appears as part of the prelim document.
  - This chapter should contain enough content to, at a minimum, comprise a submitted WSC or other conference paper. This paper should not be a one-off paper on a random topic, but instead should form a base of work from which the student and advisor anticipate the rest of the thesis will flow.
  - Ideally, the prelim document would contain the first technical journal article, which would be mature in its preparation.
- Prepare for the prelim defense by giving a talk.
  - The talk may be given informally to the student's advisor(s) and Ph.D.-level colleagues, as a guest lecture in a graduate-level class on campus, or as a seminar on-campus. More experienced students may have presented at a professional conference already.
- Create and maintain an academic CV.
  - The CV should be distributed to the committee at each milestone, so that the committee can evaluate whether the student is having appropriate growth experiences and opportunities.
  - The CV should include standard information listed in reverse chronological order (newest items first), as well as:

- \* positions held, including any jobs or internships;
- \* journal articles published, under review, or in preparation; for articles under review, include history information such as dates of submission for all versions/revisions of articles and links to any preprints on the web;
- \* conference proceedings under review, accepted / to appear, or published;
- \* talks, seminars, or posters scheduled or given, including co-authors, title, location, and date (month, year). Future talks may be indicated as “upcoming.”
- \* awards or honors;
- \* teaching and mentoring experience (include GTA positions here);
- \* service experience (e.g., as referee or on campus);
- \* memberships in professional societies.
- \* (for the convenience of the committee), all courses taken so far in which the student has achieved a grade of B- or better. Include course number, course title, instructor name, and method of grading (letter grade, pass/fail, audit; inclusion of actual letter grades achieved is optional.) It is incumbent upon the advisor to verify that this list is accurate and complete by verifying it with the student’s transcript.

### 3. EXPERIENCES FOR PH.D. CANDIDATES BEFORE THE FINAL DEFENSE:

- *Communicate work to the community:* Give a talk (not a poster) at a professional conference containing an appropriate audience for your work.
  - For operations research students, appropriate conferences may include INFORMS, WSC, APS, ICS, ICCOPT, MOPTA, ICML, and others.
  - Ideally, the student will also participate in an appropriate Ph.D. colloquium.
- *Prepare for the job market:* Update the academic CV for submission to the committee along with the dissertation document.
  - Include job offers accepted prior to the defense, if any.
- *Complete at least one round of formal peer review for an archival journal:* Submit a journal article, receive the first round of reviews, and re-submit a revised version of the article.
  - This article should form a significant part of the thesis work.
  - The revised version of the article may be submitted to the same or a different journal; that the article has been revised after peer review can be indicated in the history information listed on the CV.
- *Demonstrate the ability to lead research:* Be the primary or lead author for the work comprising at least one technical chapter of the dissertation document.
  - The chapter(s) for which the student was the lead author should be indicated to the committee, so that the committee can evaluate the student apart from the advisor.
  - Ideally, this chapter will form the basis of the student’s second or third major journal article from the thesis, and will be well-developed enough to submit shortly after graduation, if not before.