



Department of Bioengineering

UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS

PhD Candidate Preliminary Examination Description

At the end of the first year in the bioengineering PhD program, students will take the first of three major examinations: the preliminary (prelim) examination. The main purpose of this exam is to test the student's competency in key knowledge areas required for success in Bioengineering. Students should expect to be examined on any content from their undergraduate career through the first year coursework. The core competency topic areas are: life sciences, quantitative methods, technology, and research methods. Students need to discuss expectations with their Exam Committee. Your preliminary Exam Committee consists of at least three faculty members, including the Research Advisor, Academic Advisor (if different) and one other member. The committee must include at least two core bioengineering faculty. Students must submit a Preliminary Exam Committee Proposal to the Graduate Program Manager prior to moving forward with a Request for Exam; please allow two weeks for the proposal to be reviewed by the GAC.

The examination format will consist of three components:

1. **Research Plan:** an oral and written presentation of the research topic.
2. **Training Plan:** an oral and written presentation of the training pathway to prepare the student for research.
3. **Background Knowledge:** an oral examination of undergraduate-level competencies in relevant topic areas.

These three components are described in more detail below. Students must discuss these requirements with their research advisor in February, and assemble their Preliminary Examination Committee in March. Once assembled, students must submit their committee names to the Graduate Affairs Committee (GAC) for review. Students must await the GAC's approval before submitting a formal Request for Exam. All written materials – Research Plan and Training Plan – must be emailed to the student's Preliminary Examination Committee at least two weeks prior to a proposed exam date. They must carbon copy (cc) the Graduate Program Coordinator and include a formal Request for Exam.

All committee members must hold current regular or special appointments to the Graduate Faculty on either the Denver Campus or the Anschutz Medical Campus. A list of Graduate Faculty can be found on the Graduate School website. If you have any questions, contact the Program Coordinator.

Members of the Preliminary Examination Committee may be retained as members of a student's future Dissertation Advisory Committee and serve on their Comprehensive Exam and Defense committees. However, students may also choose to update membership at each milestone as their research and mentoring relationships evolve.

The Exam Part 1: Research Plan

A PhD student is expected to identify a relevant bioengineering research topic for their proposed dissertation, working closely with their research advisor. With the committee members identified, and with the help of the Research Methods class, they should prepare a 30-minute presentation and associated written proposal (2-3 pages) covering the following topics:

1. **Research goals and hypothesis:** a brief (1/2 page) introductory summary of the major goals of the proposed research, and the overall research hypothesis that drives these goals.
2. **Background and Significance:** a summary of relevant background material gathered primarily from peer-reviewed journal articles, which support the research goals and hypothesis. Given that the first year of study consists of didactic training, this plan is expected to be general in detail, and it does not need to include preliminary research results or detailed research methods and approach.

Part 2: Training Plan

Based on the research topic proposed in the first part of the exam, students will create a 15-minute presentation and an associated 1-page written training plan that describes their career goals/objectives and the training activities to be undertaken for timely degree completion. It is suggested that this proposed plan be presented in an easy to read year-by-year table format.

The second part of this plan may be broken down as a description of the following topics:

1. **Formal Didactic Training:** coursework and its contribution to the research area (to include both previous and proposed coursework)
2. **Informal Training:** planned meetings, seminars, workshops; proposed committees and mentoring relationships; additional collaborations with faculty not serving as committee members; informal class/training arrangements; teaching opportunities etc.
3. **Peer review:** plans for journal submissions, conference abstracts and/or grant applications.

Part 3: Background Knowledge

With their research mentor(s) students must identify three fundamental knowledge areas appropriate for their proposed research. It is recommended that one of these areas include the anatomy and physiology of the biological system studied. For example, a candidate studying a new ultrasound imaging modality for blood flow might select (1) acoustics, (2) fluid dynamics and (3) cardiovascular anatomy and physiology. Students will work with their research advisor and committee members to select material that they will use for preparation in these three broad knowledge areas. Students will be expected to know this material in detail and answer questions on this material in the oral presentation described below. It is important to note that the expectation is for candidates to demonstrate an undergraduate-level competency in these knowledge areas. They are not expected to have completed all the graduate coursework in these topics before the preliminary exam.

Following the exam, the Preliminary Examination Committee will then make one of the following decisions:

1. Candidate has unconditionally passed the exam.
2. Candidate has conditionally passed the exam. (Conditions that the candidate must fulfill are specified in a written report along with a deadline for satisfying stated conditions.)
3. Candidate has failed the exam. The committee may then recommend that the student stand for the Preliminary Examination a second time or they may recommend that the student.