PURDUE Weldon School of Biomedical Engineering PhD Handbook

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Mission & Vision

Overall Vision for Weldon Grad Program: Aspirations of the Program

An exceptional graduate education and training program that empowers the next generation of leaders in biomedical engineering to contribute to improving healthcare delivery, patient outcomes, and quality of life through pioneering scientific discoveries and their translation

Overall Mission for Weldon Grad Program: Achieving our Vision

To provide an exceptional training environment for Weldon School's trainees that is grounded in 1) broad mentorship from faculty, staff, and peers, 2) a consistent curriculum grounded in both fundamental theories and practical applications of biomedical engineering that prepares trainees to perform ethically, scientifically, and technically rigorous research, 3) facilities for performing collaborative, multi-disciplinary research using cross-functional methods, 4) individualized professional development opportunities, and 5) an environment with a shared culture and values that allows each trainee to achieve their highest potential.

Core Values of the Weldon Grad Program: What We Stand for

- We collectively hold all individuals to a high standard of ethical and respectful behavior.

- We provide exceptional mentorship of trainees (broad-based faculty, staff, and peer mentoring of each individual).

- We implement empathy, grace, and intentionality in all our activities.

- We provide BME graduate students with support for a well-rounded training environment where they can achieve their highest potential.

- We support graduate students' engagement in professional development opportunities that will enhance and strengthen their portfolio for their chosen career path.

- We celebrate each member's unique lived experiences and perspective and collectively make the Weldon School a community that people want to engage with.

Hallmarks of a Weldon PhD degree

- Critical analysis of challenges to human health and wellbeing, through evaluation of emerging and existing solutions, identification of gaps, and generation of testable hypotheses in significant biomedical research areas

- Rigorous and reproducible methods, experiments, and data analyses

- Development and/or use of innovative technologies, techniques, and methods to overcome critical biomedical challenges

- Excellence in scientific and technical communication, through critical analysis, interpretation, and dissemination skills that move the field forward

- Ethical conduct of research

Commitment to Good Mentoring

Respect and Integrity is the bedrock of our community. A lasting and impactful mentoring relationship is a result of clear communication and expectations, professionalism, and consistency. We celebrate and recognize the individuality of each community member. We expect contributions from all and build relationships through collaboration, networking, and team work. We value **developing the individual**. We support the person where they are and coach them to meet their professional and personal goals. We celebrate failures and successes as critical pieces of the growth process.

As biomedical engineers at Purdue, we are taking intentional steps to act against all forms of racism, sexism, ableism, xenophobia, transphobia, and other structures of oppression embedded in the fabric of our society. We understand that this commitment is a long-term endeavor and affirm efforts that improve the climate within our academic institution.

We will actively strive to educate ourselves, humbly learn from our missteps, and to commit to building a safe climate where our faculty, staff, and students can thrive. We commit to actively celebrating, learning from, promoting, and advocating for all of our students, staff and faculty.

[Student Advisor Expectation Scale](#)

Preferred Communication Methods

Your student support team uses many ways to communicate important information to students. The most common means of communication is your Purdue email. Students must check their Purdue email daily. Student support staff provide links to schedule one-on-one meetings within their email signature blocks. These links utilize BoilerConnect and should be used for all 1:1 meeting requests. Students will also receive a weekly newsletter via email each week from the grad office with professional development opportunities as well as job announcements. Our team is available year-round and can assist in answering a variety of questions pertaining to your training.

Milestones of the PhD Program

[PhD Milestone Timeline](#)

A series of milestones have been developed to facilitate the training of our PhD students on their pathway to becoming independent researchers in biomedical engineering. The following skills are hallmarks of a Purdue PhD in Biomedical Engineering and place our students in a position to succeed and become leaders in one or more of many possible career paths (e.g., academia, industry, clinical, global health):

- Critically analyze the literature and identify research gaps in an area of biomedical engineering
- Develop a meaningful research question with a testable hypothesis
- Design rigorous and reproducible experiments to test this hypothesis and fill the identified gap

- Develop and/or use technology to perform these experiments and generate publishable data
- Critically analyze, interpret, and disseminate their own data to move the field forward in fundamental, translational, or clinically relevant ways.
- Participate in all training, research, and related translational activities in an ethical manner

The PhD milestones are checkpoints for students to demonstrate expected competencies in the above skills as they progress through the four major milestones of our PhD Program: Qualifying Exam, Prelim Exam, Grad Student Research Seminar, and Defense. They are also critical opportunities to identify areas of professional growth for each trainee and for the faculty to provide them with the mentoring they need.

Academic Integrity and Generative AI Use

Academic Integrity

Refer to the University [Academic Integrity and You: Graduate Edition](#) for information and examples of academic integrity and dishonesty.

Generative AI Use

Graduate program level educational documents like the qualifying exam are intended to demonstrate independent analysis, synthesis, and interpretation of ideas, data, and findings generated by the student in their research of scholarly literature and experimental discovery. These student works are evaluated for independent scholarly ability and technical mastery in a particular field or fields related to biomedical engineering. As such, any use of generative AI must be clearly indicated as supportive and supplemental assistance in the scholarly effort. Appropriate quotation and citation must be documented for use of AI generated text and any lack will be considered as plagiarism and academic dishonesty with repercussions as indicated in the [Purdue Academic Code of Conduct.](#)

Individual Development Plans

You will meet with your faculty advisor every fall to complete your individual development plan (IDP). There are different IDP's depending on which year of the program you're in. You can find the IDP forms here:

[BME IDPs: Years 1, Year 2, & Years 3+](#)

Annual Mentoring/Thesis Committee Meetings

In years when an exam isn't completed (qual, prelim), PhD students are required to meet with their entire mentoring committee. This meeting will provide students an opportunity to discuss their current progress, future goals, individual development plans, or anything else necessary to support quality mentorship. You will work with your committee members to identify specific needs for this meeting so make sure you are communicating with them in regards to their expectations.

If students complete a qualifying exam or preliminary exam during the year (fall or spring semester), that will satisfy this committee meeting requirement for that year.

Timeline: Typically, Spring Semester

Committee Make-up:

- Qualifying Committee/Mentoring Meeting:
    o 3 BME faculty members
- Thesis Committee Meetings:
    o 4 Members that align with your research (can be your thesis committee)
    o Can be different than your qualifying committee
    o 3 Members must be present at annual mentoring meeting

Changing from Master's degree to PhD

At times, a BME master's student making swift and positive progress in research and academics might be recommended by their faculty research advisor to forgo the master's degree and change to the BME PhD program. Because there are differences in degree requirements and timelines and other factors to consider, BME master's students in this situation are required to schedule a meeting with the BME grad programs office and the BME grad programs director to discuss all aspects of such a change and address any questions to ensure their understanding before the change of degree objective will be considered for approval. If approved, the BME grad programs office will assist with the paperwork necessary to apply for the change. The final approval is made by the OGSPS office.

Qualifying Procedure

Purpose of the Qualifying Exam:

Any independent researcher must be able to propose significant research questions based on existing gaps in the field, which are identified through critical analyses of the literature. This skill is fundamental to any area of BME research, and is thus a major focus of the Qualifying Exam. We have found that a solid foundation in fundamental skills that are lucrative in PhD-level careers are the ability to:
1) **critically analyze a small subset of literature on a specific topic of interest,**
2) **identify gaps in the literature, and**
3) **plan a research strategy to address that gap by formulating a specific research question with a testable hypothesis**

The written and oral components of the qualify exam and mentoring-committee process are designed to evaluate whether the student has reached the bar for competency required to advance through their PhD training, as well as to discuss appropriate coursework, technical training, and professional development for the student given their desired career path and goals.

We do not expect students to be able to propose a full thesis project at the end of their first stage of PhD training.

The specific goals of our qualifying exam and associated mentoring-committee process are:
- to ensure all doctoral students have appropriate competency in the following areas:
    o Appropriate and realistic experimental design to test the hypothesis (in the form of a Research Strategy - not specific thesis aims but a 1-2 year in scope project)
    o Technical foundations in fundamental principals as identified in the common breadth areas

- o Critical analysis and synthesis of literature
- o Gap or needs identification
- o Development of a specific research question with a testable hypothesis to address the gap/need
- o Technical and Scientific Communication
- o Ethical and responsible conduct of research
- to identify areas of professional growth for each student
- to help the student in development of a training plan to best support their career development

Below provides guidance to both students and faculty for understanding the expected standards of performance for the –*Qualifying Exam, Plan of Study, and Mentoring Meeting*, which consists of both written and oral components that are evaluated by a Mentoring and Qualifying Committee.

Logistics/Process:

Choice of Core Primary Literature on which to base the Qualifying Exam

The qualifying exam is NOT intended to represent the development of an entire thesis proposal, but rather a small-scope topic that addresses the specific goals of our qualifying exam (listed above) The requirement is that the student can demonstrate the expected competencies required to advance in the PhD training program. As such, the student should work with their primary mentor to pick a set of five (5) primary-literature papers and 1-2 relevant review papers as a core basis of evaluation for the qualifying exam. Expanding from the core papers, the student will find an additional 5-10 primary papers independently. This combination of papers will form the small set of literature that the student will critically analyze and synthesize to identify the scientific gaps they wish to pursue.

Mentoring and Qualifying Committee Makeup

Because our training program emphasizes rigorous and consistent mentoring throughout a student's training and since the qualifying exam is unique to BME, you and your faculty advisor will select a committee with the following members:
- The primary research advisor(s)
- BME co-mentor or 1 additional BME primary or joint appointment faculty member chosen by the student in collaboration with their research advisor(s), who is likely to be on a thesis committee.
- 1 BME member outside of your primary research area (BME primary or joint appointment) chosen by the student and their faculty chair/s who is unlikely to be on the thesis committee.
    - o This choice will ensure that at least 2 research areas are covered on a student's qualifying-exam committee for breadth and uniformity of evaluation across the school.
- Your committee should only consist of 3 people and no more.

Part of the oral component of the qualifying exam is a discussion of future coursework, and thus this committee also serves as the student's plan of study committee (required by OGSPS). Although some members from your qual committee may be on your thesis committee, flexibility exists when forming your thesis committee.

Choice of Research Question

Students are encouraged to develop their qualifying exam research question based on the research they plan to pursue for their thesis. This topic should be chosen to allow the student to develop an original experiment that will advance the current state of the chosen research field. The student's proposed research can be related to ongoing work in the mentor's lab or work previously performed by the student, but must ultimately represent a novel research question. While it may be related to ongoing work by others in the lab, the student should complete the qualifying exam without intellectual feedback (on the literature synthesis and critical gap) and without writing assistance after the initial set of core papers are selected on the [PhD Qualifying Pre-Registration Form](#). As such, it is expected that the specific research question will be distinct from or a novel formulation of a research question that has already been proposed and/or funded by the mentor.

Specifically, student proposals must satisfy all of the following criteria:

1. Research question cannot be identical with the student's past (prior to starting the PhD) research projects.
2. Research questions cannot be identical to any goal of ongoing or proposed research projects in the mentor's lab being conducted by the mentor, postdocs, graduate students, undergraduates, or technicians.
3. The research questions must be different from those of research groups actively collaborating with the mentor's laboratory.
4. The research questions must be based on the small set of primary literature (i.e., 5 papers chosen by mentor and student, plus 5-10 additional identified by the student).

Timing and Logistics of the Qualifying Exam

- [Qual Timeline](#)
- [Non-Default Qual Timeline](#)

The default timeline for students admitted for a fall start is to take the qualifying exam is in spring semester of Year 1. However, given the diversity of backgrounds and experience of our entering PhD students, flexibility exists for taking the qualifying exam earlier or later than the default (in either case, a request for alternative timing may be submitted through our [waiver form](#)). A reasonable non-default timing for the qualifying exam will not be used in judgement of student progress in the program.

Failure to meet any of the Qualifying Exam deadlines is considered an automatic no pass.

Scheduling the Qualifying Exam

For efficiency in arranging the date and time to hold the qualifying exam, students should use an online tool such as [when2meet](#), [Doodle](#), etc., to determine their committee members' availability. Once the date and time are identified and confirmed with all qual committee members, students must reserve an appropriate conference room using a Purdue scheduling system such as the [BME conference room request form](#) for BME conference rooms or [Unitime](#). If you are struggling to find an available room on the date and time you need, contact the BME graduate office for other suggestions.

Preparation of the Written Document

The first part of the qualifying exam process is the evaluation of a written document that is intended to demonstrate student competency in the areas listed above as well as their research and academic progress and career goals. The written Qualifying Exam document is expected to be written independently by the student and contain solely their original critical analysis and synthesis of the literature surrounding their research area.

Written Document Format Requirements

- 6-10 pages single spaced (including figures).
- 11 pt font size or larger. Font must be no more than 15 characters per linear inch (including characters and spaces). At least 0.5-inch margins.
- Reference style can be:
    - IEEE, listed and numbered in order of citation, not alphabetically.
    - AMA format, also listed and numbered in order of citation, not alphabetically, but numbers are cited in text in superscript
    - APA format, cited in text with author, date and listed in bibliography in alphabetical order

Content

- **Executive Summary (0.5 pages).** Concisely identify a significant research question and a testable hypothesis that will address an identified need/problem. Specify the broad goal and research strategy of the proposed project that will be used to test the hypothesis.
- **Scientific Premise of Proposed Work (~2 pages)**. Critical analysis and synthesis of 10-15 primary papers from the literature to identify significant scientific gaps, culminating in a concise and explicit statement of a research question and testable hypothesis. *Note: the ~2-page length of this section (similar to a grant proposal) does NOT imply a lack of depth is expected in your critical analysis; rather, the 2-page length requires concise and organized writing about a thorough critical analysis leading to clear gap identification and hypothesis development*
- **Proposed Research Strategy (~1 page).** Describe an experimental strategy that will be used to test the stated hypothesis and fill the identified gap. This section does NOT need to be a full set of specific thesis aims, but rather an appropriate research strategy (an experiment described at a broad level, but with enough detail to demonstrate the feasibility and appropriateness of scope, e.g., rough number of subjects, design specs). Describe the procedures to be used, the data to be collected, the planned analyses of data, and how the data will be interpreted to test your hypothesis/research question. Again, this does NOT need to be a full thesis proposal, only a simple description that is just detailed enough to demonstrate that the proposed work is rigorously designed to test your hypothesis/research question (i.e., to demonstrate required competency to advance in your PhD training).
- **Caveats, Potential Problems, and Alternative Approaches (0.25-0.5 pages).** Discuss any potential issues you see in the proposed work and how you will address them if they arise.
- **Ethical Considerations (0.5 pages).** Describe the ethical considerations you will need to address in the proposed work. This does NOT need to be a full Vertebrate Animals or Human Subjects section, but rather a description of any relevant ethical considerations for your work and broadly how you will address them. The purpose at this qualifying stage is simply to demonstrate your awareness of the relevant ethical

considerations for your work; the prelim exam will evaluate your ability to address them.
- **TimeLine of Proposed Work (0.25 pages).** Describe the planned timeline of your proposed work to demonstrate appropriateness of scope.
- **Progress Report (1-2 pages).** Describe the research progress you have made to date in the PhD program and how it addresses the feasibility of your proposed work and/or supports your hypothesis. If you have data, this should be presented and critically analyzed. If you do not have data yet (this is completely fine), describe your progress to date and critically analyze what is working and not working to demonstrate that adequate research progress has been made.
- **References** (does not count for page limit).

Other Documents to Include in your Written Qualifying Exam package (not included in page limit):

- **Cover Sheet**—should be used as a checklist for needed documentation
- **CV** or **Biosketch**
- **Individual Development Plan (IDP)**
- **Plan-of-Study (POS) document**: courses taken and planned, with alternates.
- **Unofficial transcript**

Evaluation of the Written Document

The written document is submitted to the committee at least two (2) weeks before the Mentoring-Qualifying Committee meeting. Based on the well-defined expectations in this Qualifying Process document and the Mentoring-Qualifying Committee Meeting Rubric, all faculty on the committee will provide constructive written feedback to the committee Chair (mentor) prior to the Mentoring-Qualifying Committee meeting, if possible, so that the committee is aware of significant concerns that need to be addressed during the mentoring meeting/oral exam. The rubric provided by the Graduate Committee is based on the stated expectations, research progress as well as strengths and weaknesses in each major category (e.g., appropriate literature analysis, scope of hypothesis/needs statement, technical writing). This feedback is ultimately combined with feedback on the mentoring meeting/oral exam and provided to the student to help them understand their performance and areas for growth.

Plagiarism Scanning and Generative AI Use

All written documents will be passed through plagiarism-detection software by the student's faculty advisor. Students are encouraged to utilize additional plagiarism resources for guidance. Plagiarism in the qualifying-exam document will be grounds for failure of the exam, and will be reported to the Office of the Dean of Students (ODOS) and Office of Student Rights and Responsibilities (OSRR). Please refer to the BME AI policy and the Purdue Academic Code of Conduct for additional information.

Structure of Oral Component: Qualifying Exam and Mentoring Committee Meeting

A two-hour (non-public) meeting must be held before the specified deadline for the semester in which the student has registered to take the Qualifying Exam
This meeting will consist of (student present for numbers 1-3, and 5):
1. a ~30-min oral presentation of the material in the written qualifying submission (written document, coursework taken and planned, career-path plans, and desired professional development).

2. ~45-min discussion on student's proposal and relevant technical background, and
3. ~30-min discussion on coursework- and IDP-related issues
4. ~10-min private discussion among the committee [student excused], and completion of group rubric with constructive feedback
5. ~5-min discussion with student of rubric feedback

The committee, through questions and discussion, will be responsible for evaluating the student's competency in:

1. Breadth of BME fundamentals (*defined by Grad Committee, applied to all students*)
2. Technical depth in research topic (*specific to student and assessed by committee*). Note: Questions on course material and technical foundations critical to topic area are expected to be asked by committee in order to identify gaps in training and suggest further courses or further training.
3. Identification of research gap and ethical issues
4. Development of research question and testable hypothesis
5. Critical analysis and interpretation of data

Other Mentoring Components of the Oral-Exam Meeting

Discussion and Evaluation of Research Progress
Students will be evaluated on appropriate technical depth for a first year PhD student on fundamental principles in student's research area, their ability to critically analyze and interpret data and on their level of independence. During the evaluation, committee members will discuss areas of improvement (if needed) in these areas and may suggest additional courses, professional development or other resources in able to help the student successfully progress in their training.

Discussion of breadth of BME fundamentals
A set of fundamental skills have been identified by the BME Graduate Committee as necessary training for a PhD in Biomedical Engineering from the Weldon School of Biomedical Engineering. Although the graduate committee deems these competencies necessary for all our students, we understand the need for flexibility when determining the appropriate depth each student needs to have in each area. The relevance of each of the competency areas and the degree to which each competency is met will be self-evaluated by the student and then discussed by the committee members as part of the qualifying exam.

Discussion of academic progress to date and planning of course work
A joint discussion with all committee members of the POS coursework helps to ensure the student is taking the most relevant and valuable courses to develop the technical skills and knowledge required to become an independent researcher in the student's chosen research area. Discussion with the committee members will provide integrated advice for the student based on the broader perspectives of several BME faculty members. An official POS must be approved and filed electronically with OGSPS by June 1.

Discussion of IDP and career development path advising documents
An important part of the mentoring committee meeting is to ensure the training plan being developed includes the most appropriate activities to provide the student with the training needed to achieve their technical research as well as their career goals. This will include discussion of the student's IDP, CV, and relevant professional development activities within BME, the College, the University, and beyond. Relevant career paths should be discussed to ensure the student is aware of and planning for the experiences needed to succeed in their chosen career path.

Overall Feedback and Potential Outcomes of the Qualifying Exam

- Qualifying Exam Results Flow Chart

At the end of the meeting, the committee will discuss privately the student's level of competency in key areas based on both the written and oral components of the exam. The Chair (primary mentor) will complete a group rubric based on this discussion, noting recommendations to the student and any lack of consensus on the form. Each committee member will provide brief individual feedback on the key strengths and areas for growth (usually 1-2 sentences each). The Chair and Committee will then discuss the outcome with the student based on the rubric to ensure everyone is on the same page. The Chair will complete one rubric online to summarize the outcome, recommendations, and other key discussion points. A copy of this rubric will be sent to the Chair, Grad Office, and student once it has been submitted.

Possible outcomes are:

- Pass
  - o Recommendations for technical and professional development and specific courses can be suggested or required by the committee.
- Provisional pass (i.e., only one component has significant but correctable issues)
  - o Written document revision required (based on specific feedback) within 3 weeks after feedback. All revisions must demonstrate significant improvement as documented by committee re-review and rubric completion
  - o Oral exam must be repeated within 2 months after feedback (based on same written document).
  - o Once the committee clears the provision(s) of the pass result, the Chair must inform the Grad Office of the final result. Another online rubric is not required.
  - o If the provisional exam is not turned in within 3 weeks of the original due date, the exam outcome turns into a no pass.
- No Pass (both components have significant issues, or plagiarism or other academic misconduct occurred)
  - o Repeat whole process by the next spring or fall semester
  - o If the final results are not turned in within 3 weeks of the due date, the exam outcome turns into a fail.
- Fail (if student does not pass on 2nd attempt)
  - o Student may move to MS option or appropriate alternative program with proper approval, guidance, and mentoring from BME Grad Program.

Relevant Forms

Relevant Resources

- Qualify Guidance Sheet for Faculty and Students
- Approved PhD Course List
- Career Development Path Advising Documents
- Purdue Writing Lab (OWL)
- Academic Dishonesty Policy
- Tips to Avoid Plagiarism

Preliminary Exam Procedure

- [Prelim Timeline](#)

Rationale

The Preliminary Examination is a formal requirement of Purdue's OGSPS, with successful completion of the Prelim Exam advancing a PhD student into *PhD Candidacy* **Preliminary examinations must be completed no later than the end of the first semester of the third year of the PhD program.** If you find that you will not be able to meet this deadline, a [waiver form](#) will need to be filled out and approved sometime during the semester it is due.

Expectations

The expectations we have set for passing the Preliminary Exam represent a rigorous but attainable bar that is defined by our experience with the level of competency required to ensure likely success in completing rigorous, impactful, and independent PhD dissertation research. *Note: this bar does not require substantial work on the Dissertation to be completed before the Preliminary Exam, merely that sufficient preliminary research has been completed to demonstrate the student's competencies in the areas detailed below.*

Purpose of the Preliminary Exam

The OGSPS places responsibility on the department faculty to determine when a PhD student is ready to be admitted into candidacy for the PhD degree. This process culminates with a required preliminary examination, which is administered by the student's PhD Thesis Committee, with the purpose of evaluating whether the student is prepared to undertake independent research for their dissertation.

In BME, candidacy requires that a student demonstrate through both written and oral formats that they have:

1) the appropriate depth and breadth of knowledge to complete their dissertation research,
2) the ability to conceptualize and perform meaningful research in their chosen area,
3) the technical skills required for their PhD dissertation work (or an appropriate plan for obtaining them in a timely manner according to their training plan timeline)
4) the intellectual ability to critically analyze and integrate knowledge from the literature to form a significant research question and testable hypothesis appropriate for a dissertation,
5) proposed an appropriate experimental design to address their research question adhering to all principles for ethical and responsible conduct of research (RCR)
6) the ability to communicate well in written and oral formats
7) developed an appropriate training plan to complete their dissertation research and professional development to position themselves to be successful in their chosen career path.

Importantly, candidacy does not require that substantial dissertation work be completed or that all training is completed, rather it only requires that the student can demonstrate their readiness to perform independent research for their dissertation project and to obtain the remaining necessary training for career development. If additional time past the first semester of the third year is needed, a waiver for an extension must be filled out. This waiver must be supported by the faculty mentor(s) and will be reviewed by the Director of Graduate Programs prior to approval.

Multiple benefits to the student for completing the prelim exam at this stage of training include:

1) input from the entire thesis committee at a stage that can help to
   a. improve research-question formulation and experimental design,
   b. Identify technical gaps in the student's knowledge early in the student's training so that courses or other remediation can be completed in a timely manner, and
   c. improve the student's training plan with plenty of time for additional training to occur
2) preparation of the written prelim document in the form of a fellowship or grant proposal can help the student be ready to apply for a variety of national funding fellowships, and
3) many fellowships (on and off campus) require the student to be admitted to candidacy to apply.

The specific goals of our Preliminary Exam and associated mentoring-committee meeting are:
- to ensure all doctoral students have achieved the appropriate competencies listed above
- to identify areas of need for continued professional growth and training for each student
- to evaluate the student's training plan and ensure it will best support their career development

Logistics/Process

Choice of Dissertation Research Question and Specific Aims

The research question should be chosen to allow the student to develop an original set of Specific Aims that will impactfully advance the current state of the chosen research field. The choice must be supported by a well-developed scientific premise based on review of the relevant scientific literature.

Specifically, the Research Question or Specific Aims:
1) must be novel and distinct from the student's past (i.e., prior to starting the PhD) research projects.
2) can be related to ongoing work in the mentor's lab but must be novel and distinct from ongoing or proposed research projects being conducted by the mentor, postdocs, graduate students, undergraduates, or technicians.
3) Must be different from those of research groups actively collaborating with the mentor's laboratory.

In choosing a Research Question and Specific Aims, the student should focus on what they can do that is independent and that will have significant impact on advancing the field. The student should challenge themself to be innovative, but in impactful ways that will facilitate the field to move forward.

Thesis Committee Makeup

Broad advising on the student's dissertation research and training plan is important throughout the PhD Training Program. The Thesis Committee must include:
1) at least four (4) members total,
2) at least two (2) of which must be BME faculty members from the Weldon School,
3) and one (1) be an outside faculty member that is affiliated with another department at Purdue or another institution.

For committee members from outside Purdue, paperwork for their special appointment needs to be filed with OGSPS at least 30 days prior to the prelim exam date to ensure they are approved by BME and CoE in time to be listed on the Form 8. Note that OGSPS requires at least 51% of the committee to be Purdue faculty members.

Timing and Logistics of the Preliminary Exam

Students must complete the prelim examination in their second year but by the first semester of the third year at the latest. If additional time, past the first semester of the third year is needed, a waiver for an extension must be filled out. The oral exam must be formally scheduled with OGSPS at least 2 weeks prior to the proposed exam date. A written prelim document (described below) must be submitted to the thesis committee two weeks prior to the scheduled oral exam (committee must approve any delays to this deadline).

The oral exam consists of a public presentation with questions from the audience and a closed-door exam session with more specific questions and discussion with the committee.

Prelim Scheduling Requirements

- Your official electronic plan of study must be submitted and fully approved with the majority of your course work successfully completed before you will be allowed to schedule the prelim.
- Work with your research advisor (and thesis mentoring committee) to formalize and arrange an appropriate preliminary examining committee.
- Arrange a date, time and room for your preliminary exam with your research advisor and thesis advisory committee members. Fully online or hybrid prelims are allowable with your faculty advisor and committee approval. If prelim is hybrid or fully online, student is responsible for making all necessary teleconference arrangements.
  - Scheduling a Room – A minimum 2-hour period should be reserved. The preferred room for in person or hybrid preliminary exam is MJIS 2001. To book a room, complete the reservation request.
    When submitting your request, you must include:

    - Name
    - Email
    - Name of group/lab
    - Room number
    - Date
    - Start/End time
    - Number of attendees (estimated)

    You will receive a confirmation email once your reservation is approved. If MJIS 2001 is not available on the day and time you need, contact the Senior Grad Program Assistant (currently Sandy May) for other acceptable room suggestions in the vicinity of MJIS.

- Submit the electronic GS Form 8 to officially schedule your exam with the OGSPS
  - Log in to myPurdue and find the link on the Graduate Student card. This form must be initiated by you and be fully signed at least two weeks before the proposed exam date. Your exam is not officially scheduled until the OGSPS grants final approval.
- Two weeks prior to your prelim exam, email the Senior Grad Program Assistant (currently Sandy May) the following information for announcing your prelim in BME:
  - Your name
  - Research title
  - Names of thesis committee members, with major professor designated
  - Date, time and place of the preliminary examination
  - An abstract (no more than 250 words) of the prelim proposal clearly defining the problem and its significance

Preparation of the Written Document

The written document for the Prelim Exam will consist of two parts: *The Research Proposal* and *The Training Plan*, the format is designed to easily convert to fellowship proposals if you so choose. Although not all students will pursue formal fellowships, the development of this type of proposal is critical for ensuring that students obtain the research and professional-development training they need to develop into independent researchers who will have a sustained impact on biomedical research. Specific formatting requirements are described below; however, if a student is submitting a formal fellowship or grant proposal, they are encouraged to use that proposal as their prelim document if it covers all of the sections described below and can adequately demonstrate the required competencies listed above. This flexibility in format and length (at discretion of the thesis committee to best support the needs of the student) is allowed to provide the student with the benefit and efficiency in obtaining committee feedback on their actual proposal document; however, additional documents or sections will be required if the proposal does not include all of the BME-required sections (e.g., if a grant proposal does not include a training plan, one must be included in the prelim document).

Format Requirements

- Research Proposal of 6-12 pages single spaced (including figures and tables, but not including Abstract, Specific Aims, References, and additional material); Training Plan of 3-6 pages single spaced (not including CV or optional pages); an unofficial transcript; and Individual Development Plan.
- 11 pt font size or larger. Font must be no more than 15 characters per linear inch (including characters and spaces). At least 0.5-inch margins.
- Reference style in one of the following formats (and consistent throughout the documents):
    - IEEE, listed and numbered in order of citation, not alphabetically. (
    - AMA format, also listed and numbered in order of citation, not alphabetically, but number are cited in test in superscript
    - APA format, cited in text with author, date and listed in bibliography in alphabetical order

Content: Research Proposal

- **Lay-Person (Public) Abstract (0.5 pages, separate page).** Concisely and accurately describe the proposed work, including the research topic and identified gap to be filled, the research question and testable hypothesis to be explored in this work, the research strategy and approach designed to fill the gap, and the significance of the work for the field in both the short- and long-term. This abstract should be written at a level that is understandable to a scientifically literate reader. This abstract will be used to advertise the Prelim exam to the Weldon School and broader Purdue community.
- **Specific Aims Page (1 page max, separate page)**. This is the most important page of your proposal, as it serves as both a sales pitch and scientific description of your proposal and why it is important. It is only 1 page, but typically takes the longest time to write – best practice is to iterate numerous times during the preparation of the proposal. The "story" of why your proposal is important and will be impactful on the field must be told in a strongly compelling way on this single page. It should include a statement of a biomedical problem, identification of a gap in current knowledge, and then a suggested research strategy to fill the gap by addressing a specific research question and testable hypothesis. A list of proposed Specific Aims should be described, with just enough detail to convince the reader

your plans are well thought out and will be effective. A concluding paragraph should describe the impact this work will have on the field. Also see "[Introduction to the Specific Aims Page of a Grant Proposal](#)" for more guidance on an effective Specific Aims Page. Successful proposals are able to convince the reviewer to support the proposal based on this single page.

- **Significance and Scientific Premise of Proposed Work (~1–2 pages)**. Critical analysis and synthesis of the relevant literature on your research topic to establish the current state of the field. Significant scientific gaps must be identified, culminating in a concise and explicit statement of an appropriate research question and testable hypothesis. This section should explain the importance of the research problem, and how the proposed work will fill the identified gaps and the resulting impact on the field.

- **Innovation (~0.5–1 pages).** This section should briefly describe any innovative aspects of the proposed work, and the significance of this innovation. Innovation can be scientific or technical. Combining two established methods in a way that has never been done can be innovative.

- **Preliminary Data (~2–3 pages)**. Relevant (not necessarily all) preliminary data collected by the student should be presented and critically analyzed and interpreted. These data should be used to support the proposed hypotheses and/or demonstrate the feasibility of the proposed work by the student.

- **Research Approach (~2.5–6 pages).** Describe the general experimental strategy that will be used to test the stated hypothesis and fill the identified gap and describe its rationale. Describe the specific methodology and procedures to be used in sufficient detail to allow the reader to evaluate the likelihood of success of the proposed work. General methods can be described in their own section before or after the detailed methods for each Specific Aim. For each Aim, describe the exact data to be collected, the planned analyses of the data (including appropriate statistical analyses), and how the data will be interpreted to test your hypothesis/research question. The reader should be convinced that if this work is carried out, that the hypothesis will be tested definitively and ideally that no matter if supported or refuted, the field will be moved forward.

- **Required subsections in Research Approach** (to be included in the total)
  - **Approaches to Increase Rigor and Reproducibility (0.25-0.5 pages).** Briefly describe any approaches you will use to increase rigor, including power analyses to justify number of subjects, randomization and blinding, examination of sex as a biological variable.
  - **Caveats, Potential Problems, and Alternative Approaches (0.25-0.5 pages).** Discuss any potential issues you see in the proposed work and how you will address them.
  - **Timeline of Proposed Work (0.25 - 0.5 pages).** Describe the planned timeline of your proposed work to demonstrate appropriateness of scope. Include expected journal papers to be produced as a result of this work.

- **Additional sections in the Research Proposal** (do not count for page limit but are required to ensure ethical and reproducible research).
  - **References (required).**
  - **Data Management Sharing Plan (maximum 2 pages, required).** Follow NIH or NSF suggestions on approaches to support open science (e.g., data and analysis code sharing).
  - **Vertebrate Animal Section (maximum 2 pages, only if applicable).** Follow NIH or NSF formats.
  - **Human Subjects: Inclusion, Exclusion, Protections (only if applicable).** Follow NIH or NSF formats.

- o **Authentication of Key Biological and/or Chemical Resources (maximum 1 page, only if applicable).** Follow NIH or NSF formats.
- o Additional proposal sections (**not required**) may be submitted if the student is preparing a specific fellowship or grant proposal and desires feedback from their committee, e.g.:
  - o **Budget**
  - o **Facilities and Other Resources**
  - o **Equipment**
  - o **Biosketch**

Content: Training-Plan

- **Cover sheet**
- **CV** or **Biosketch**
- **Applicant's Background and Goals for Training (3-6 pages).** Include sections on
  1) Previous Research Experience
  2) Career Goals
  3) Training Goals and Objectives
  4) Training in the Responsible Conduct of Research (RCR)
  5) Activities Planned in Remaining Years of the PhD Training Program (Tables, with rows for various broad categories (e.g., research, coursework, profession development, conferences, paper or dissertation writing, with percentages (%) of time) are useful)
  6) Timeline for Training and Research Activities
  7) Unofficial Transcript, and
  8) Recent Individual Development Plan (IDP).

- (Optional) Additional Training Plan proposal pages may be submitted if the student is preparing a specific fellowship or grant proposal and desires feedback from their committee, e.g.:
  - o Selection of Mentor and Institution
  - o Mentor and Co-Mentor Statements
  - o Description of Institutional Environment and Commitment to Training

Evaluation of the Written Document

The written document is submitted to the committee at least two (2) weeks before the oral component of the preliminary exam. Based on the well-defined expectations outlined in the handbook and on the rubric, all faculty on the committee will provide constructive written feedback to the committee Chair (mentor) prior to the meeting, if possible, so that the committee is aware of significant concerns that need to be addressed during exam. The rubric provided by the Graduate Committee is based on the stated expectations, research progress as well as comments on strengths and weaknesses in each major category. This feedback is ultimately combined with feedback form the oral exam and provided to the student to help them understand their performance and areas for growth.

Structure of Oral Component: Preliminary Exam and Mentoring Committee Meeting

A roughly two-hour (public for ~1st hour) meeting must be held before the specified date for the semester in which the student has registered to take the Preliminary Exam by the last date of the semester.

This meeting will consist of:
1. a ~45 min oral presentation of the material in the written submission (Research and Training Plans)
2. ~15 min questions from the public audience
3. ~20-30 min closed-door discussion on student's research proposal
4. ~15-20 min closed-door discussion on student's training plan
5. ~10 min private discussion among the committee, and completion of group rubric with constructive feedback
6. ~5-10 min discussion with student of rubric feedback

The committee, through questions and discussion, will be responsible for evaluating the student's competencies required for candidacy.

Overall Feedback and Potential Outcomes of the Preliminary Exam

At the end of the meeting, the committee will discuss privately the student's level of competency in key areas based on both the written and oral components of the exam. The Chair (primary mentor) will complete a group rubric based on this discussion, noting recommendations to the student and any lack of consensus on the form. Each committee member will provide brief individual feedback on the key strengths and areas for growth (usually 1-2 sentences each). The Chair and Committee will then discuss the outcome with the student based on the rubric to ensure everyone is on the same page. The Chair will complete one rubric online to summarize the outcome, recommendations, and other key discussion points. A copy of this rubric will be sent to the Chair, Grad Office, and student once it has been submitted.

Possible outcomes (documented by committee on Form 8) are:

- Pass
- No Pass
    - Student can repeat the whole process (not in the same semester) at a later time as recommended by the committee.
    - Student may not repeat the prelim a third time, without recommendation of the committee and approval from the BME Graduate Committee. In such cases, the student would move to MS thesis option or appropriate alternative program, with guidance and mentoring from BME Grad Program.

Relevant Forms

Relevant Resources

- Monte and Libby (2018). Introduction to the Specific Aims Page of a Grant Proposal
- Landis et al. (2012). A call for transparent reporting to optimize the predictive value of preclinical research
- *The Elements of Style, by Strunck and White; Style: Lessons in Clarity and Grace by J.M. Williams; or similar guides for clarity in writing*
- Career Development Path Advising Documents
- Purdue Writing Lab (OWL)

Grad Student Research Seminar

Rationale

No matter a PhD student's career path, a critical skill to develop is the ability to disseminate their work via oral presentations to a broad audience. The research presentation requirement provides our students with a relatively low-pressure environment to gain experience with conference style presentations and receive feedback to improve oral presentation skills.

The following provides guidance to both students and faculty for understanding the expected standards of performance for the Grad Student Research Seminar milestone, which consists of an oral presentation that is evaluated by the attendees.

Logistics/Timing

All PhD students will present their research to the BME community during the fall semester of their third year.

It is not a requirement for the scheduled seminar speakers to register for BME69000 unless they plan to use Grad Student Research Seminar to meet a [requirement.](#)

Expectations

Students are required to present an in person 15-20 min research presentation that is well organized and accessible to the breadth of areas within BME. Students receive constructive feedback from all attendees regarding their research, presentation content and style, and ability to address questions.

Grad Student Seminar Rubric

Fearnot-Laufman-Greatbatch Award

The Fearnot-Laufman-Greatbatch Award will be presented to the student who gives the most outstanding presentation of the academic year. Dr. Neal Fearnot established this award based on his belief and experience that this seminar is a very valuable opportunity for students. the selection is determined by evaluations submitted by faculty, students, and staff in attendance at the seminars. The winner will receive a monetary prize, an individual plaque, and the winner's name engraved on a permanent plaque on display in the Martin C. Jischke Hall of Biomedical Engineering.

Defense

Rationale

In order for a student to demonstrate that they have met the independent-research expectations for a PhD, they must defend their work in the public domain. Likewise, they are expected to be able to disseminate their work to the field and thus must also write a comprehensive dissertation documenting their thesis research. This document is intended to provide a cohesive and comprehensive story of how all their thesis-research projects fit together to advance the field by filling in existing gaps within the scientific literature regarding a significant research question. This detailed document also often serves as an archive of their work for future students in the lab and, as such, is often more detailed than the journal papers that come from this work.

Thesis Advisory Committee Makeup

1) at least four (4) members total,
2) at least two (2) of which must be BME faculty members from the Weldon School,
3) and one (1) be an outside faculty member that is affiliated with another department at Purdue or another institution.

Logistics & Timing

Deciding when a student is ready to defend is a shared decision between the student and the thesis committee and should be made based on a mutual agreement of when a student has met the requirements for the PhD degree and in alignment with OGSPS policies.

Note: At least two full registered semesters (includes summer session) must pass between successful completion of the preliminary exam and when the defense is to be held.

Once agreement is reached, the faculty research advisor must notify the BME graduate office via e-mail to add the student's name to that semester's candidate list. OGSPS sets specific deadlines for registering as a candidate for graduation, scheduling the defense and completing the dissertation deposit, which candidates must meet in order to be eligible for graduation. Candidates are strongly encouraged to provide the complete dissertation document to their Thesis Advisory Committee at least two weeks before the scheduled oral defense. Given these stringent timelines, students should identify their applicable deadlines several months before the intended graduation semester.

Preparing for and Scheduling Your Final Exam

To help students better prepare in advance of their final thesis/dissertation deposit deadline, all students planning to graduate with a doctoral degree will be asked to submit their dissertation or thesis file for a format consultation to the OGSPS by a specified deadline in their graduation semester. While writing your thesis or dissertation, take the following steps:

At least 2 weeks prior:

- Arrange the date and time of your final defense with your research advisor(s) and thesis advisory committee members.
- Schedule an acceptable conference room or classroom in which to hold your final defense.
- Submit the electronic GS Form 8 to officially schedule your final exam with OGSPS.
- Email to the Senior Graduate Assistant (currently Sandy May) the following information:
    1. Your name
    2. Title of the Thesis Research
    3. Names of Thesis Committee members, with Major Professor designated
    4. Date, time, and place of the final examination
    5. An abstract (no more than 350 words) of the thesis proposal clearly defining the problem and its significance
    - Following the successful completion of your defense, complete the electronic thesis/dissertation deposit following the steps found on the [OGSPS Thesis/Dissertation](#) website.

Expectations

In their oral defense and written document, students must demonstrate that they have met the BME expectations of PhD graduates including the ability to:

- Critically analyze the literature to identify gaps in a biomedical area
- Design experiments to address these gaps
- Develop and/or use technology to perform these experiments
- Critically analyze, interpret, and disseminate their own data to move the field forward in translationally relevant ways

It is also expected within their defense and dissertation document that students will demonstrate they have carried out their own research by adhering to all principles for responsible conduct of research. There is no set number of published papers required to graduate with a PhD in BME because there are many factors that affect speed of publishing in various areas. A useful goal is to have two published (or accepted) journal papers by the defense, with several more in the pipeline.

Possible outcomes (documented by committee on Form 11) are:

- <u>Be certified by the faculty for the doctoral degree</u>
- <u>NOT be certified by the faculty for the doctoral degree</u>
  - o Student can be withdrawn from the Graduate Records
  - o Student may continue on with conditions as outlined by the thesis committee

Graduation

The table below shows approximate deadlines for steps leading up to graduation with the BME PhD degree. **THESE DATES ARE APPROXIMATE.** You must confirm exact dates with the BME Grad Office and refer to the [Purdue OGSPS Calendar](#).

	TO GRADUATE IN AUGUST	TO GRADUATE IN DECEMBER	TO GRADUATE IN MAY
Plan of Study submission	By end of first spring semester	By end of first spring semester	By end of first spring semester
Qualifying Exam passed	No later than end of second fall semester	No later than end of second fall semester	No later than end of second fall semester
Preliminary Exam passed (plan of study approved, almost all or all courses completed and qual passed)	By the last day of the previous summer term	By the last day of the previous fall term	By the last day of the previous spring term
Declare candidacy (faculty advisor email confirmation to BME Grad Office who will enroll student in appropriate CAND course or prepare exam or degree only registration form*)	Upon registration for summer, but no later than first week of June	Upon registration for fall, but no later than second week of September	Upon registration for spring, but no later than second week of February

Schedule Final Oral Defense (via online GS form 8 with all signatures)	At least 2 weeks prior to proposed defense date	At least 2 weeks prior to proposed defense date	At least 2 weeks prior to proposed defense date
Pass Final Oral Defense (via online GS 11 with all signatures)	Mid July	Late November	Mid April
Deposit Thesis	Late July	Early December	Late April

*Students completing degrees between semesters or who plan to defend early in a semester may be eligible for a privileged registration at a reduced fee through "exam only" or "degree only" registrations. Students must be registered for at least one research credit in the previous semester to be eligible.

BME PhD Course Requirements

Enrollment Requirements

BME PhD students are required to register full-time each fall, spring and summer semester. Full-time registration in fall and spring semesters is 8 to 18 credit hours, and in summer sessions is 6 to 9 credit hours. This could be combined course work and research, or just research credits. The combined plan of study course credits and research credits must equal at least 90 credits to meet the PhD degree requirements for graduation.

Core Competency Requirement

- 24 minimum credit hours of graduate (500- & 600-level) course work
  - 24 is a minimum. The student's thesis committee may require additional courses.
  - At least 6 of these core competency credits must be from 600-level courses. Students are required to take these courses at Purdue West Lafayette or Purdue Indianapolis and cannot transfer these in.
  - For the most part, only 3-credit 500- or 600-level courses count toward the 24 credit hour of core competency requirements. 1- or 2-credit courses are considered on case-by-case basis.
  - Students may choose to take additional courses for their own professional development or as required by their committee.
- 6 cr. hr. BME
- 6 cr. hr. Quantitative / Analytical
- 6 cr. hr. Life Sciences
- 6 cr. hr. Other Related Graduate Training
- Students must maintain minimum academic standing as outlined in this handbook.

Additional Academic Requirements

Ethics Requirement

1 credit hour of graduate level ethics (GRAD 61200, BME 56400 or equivalent)

- This requirement must be fulfilled within first year in PhD program

Seminar Requirement

4 semesters of BME seminar (BME 69000)

- Grad Student Research Seminar- may count for one of these four

BME Full Seminar Series Substitution Policy:

Although it is a critical part of PhD training for our grad students to attend the BME Seminar Series, we recognize that in some cases it could be beneficial for students to complete a seminar series course outside of BME. Students might choose to submit such a waiver request under these parameters:

1. The proposed substitute seminar series must be run as a Purdue course and appear with a satisfactory/pass or acceptable letter grade on the student's official Purdue transcript.

2. Students must submit the online waiver request form found at and receive approval prior to taking the course.

BME PhD students may choose to submit waiver requests for a maximum of two substitutions of the four required BME Seminar series.

Research Requirement

Research credits: Total plan of study courses and research must equal at least 90 credits for graduation.

- You will register for research credits every semester including summer (BME 69900 under your faculty research advisor).
- You must be registered full time for Fall, Spring, and Summer

Research Fundamentals Course Requirement

2 semesters of a cohort-based course called Research Fundamentals I and II (BME 59500) to be taken in the first year.

RF I and II waiver policy: Requests to waive taking Research Fundamentals I & II should be considered case by case and reserved for exceptional students (i.e., completed thesis master's with strong research and publications).

IBSc PhD Course Requirements

Enrollment Requirements

BME PhD students are required to register full-time each fall, spring and summer semester. Full-time registration in fall and spring semesters is 8 to 18 credit hours, and in summer sessions is 6 to 9 credit hours. This could be combined course work and research, or just research credits. The combined plan of study course credits and research credits must equal at least 90 credits to meet the PhD degree requirements for graduation.

Core Competency Requirement

- 31 minimum credit hours of graduate (500- & 600-level) course work
  - 31 is a minimum. The student's thesis committee may require additional courses.
  - At least 6 of these core competency credits must be from 600-level courses. Students are required to take these courses at Purdue West Lafayette or Purdue Indianapolis and cannot transfer these in.
  - For the most part, only 3-credit 500- or 600-level courses count toward the 31 credit hour of core competency requirements. 1- or 2-credit courses are considered on case-by-case basis.
  - Students may choose to take additional courses for their own professional development or as required by their committee.
- 6 cr. hr. BME or Engineering
  - To earn an IBSC-BME PhD degree, all 6 engineering credits must be satisfied by BME courses and the student must have a primary or official co-advisor appointed in BME. If you are
    -
- 6 cr. hr. Math/Statistics
- 12 cr. hr. Life Sciences (biology, biochemistry, other science)
- Students must maintain minimum academic standing as outlined in this handbook.

Additional Academic Requirements

Ethics Requirement

1 credit hour of graduate level ethics (GRAD 61200, BME 56400 or equivalent)

- This requirement must be fulfilled within first year in PhD program

Seminar Requirement

2 semesters of seminar course: BME 69200 or CPB 69700

2 semesters of BME seminar (BME 69000)

- Grad Student Research Seminar- may count for one of these four

BME Full Seminar Series Substitution Policy:

Although it is a critical part of PhD training for our grad students to attend the BME Seminar Series, we recognize that in some cases it could be beneficial for students to complete a seminar series course outside of BME. Students might choose to submit such a waiver request under these parameters:

1) The proposed substitute seminar series must be run as a Purdue course and appear with a satisfactory/pass or acceptable letter grade on the student's official Purdue transcript.
2) Students must submit the online waiver request form found at and receive approval prior to taking the course.

IBSc PhD students may choose to submit waiver requests for a maximum of one substitution of the two required BME Seminar series.

Research Requirement

Research credits: Total plan of study courses and research must equal at least 90 credits for graduation.

- You will register for research credits every semester including summer (BME 69900 under your faculty research advisor).
- You must be registered full time for Fall, Spring, and Summer

Research Fundamentals Course Requirement

2 semesters of a cohort-based course called Research Fundamentals I and II (BME 59500) to be taken in the first year.

RF I and II waiver policy: Requests to waive taking Research Fundamentals I & II should be considered case by case and reserved for exceptional students (i.e., completed thesis master's with strong research and publications).

Transfer Courses

BME PhD students may petition to use up to 12 credit hours of graduate-level course work from one previous master's degree toward their degree requirements, or up to 12 credit hours of graduate-level coursework which has not been applied to another degree, within the following parameters:

- Transfer courses must be 3 credits each with grades of B- or better.
- Both 600-level courses required for the BME PhD degree must be taken at Purdue West Lafayette or Indianapolis.
- Both BME core competency courses required for the BME PhD degree should be taken through the Weldon School of Biomedical Engineering at Purdue.
- Seminar courses and project or independent study courses do not qualify for transfer.

During the first semester of PhD study, students should prepare the Transfer Course Petition Form and discuss it with their faculty research advisor. Upon agreement, the student and faculty research advisor should sign the petition form and submit it to the BME Graduate Office. The Senior Graduate Program Assistant will review the petition to ensure it meets the requirements of OGSPS and, if so, will file the petition for later use during the plan of study submission phase. Any concerns about the petition will be brought back to the student and their faculty advisor in a timely manner.

Dual Degrees

Dual degrees are allowed outside of BME with proper approval from the outside school and your faculty advisor. Pursuing dual BME degrees is not an option. For example, you cannot be awarded both a BME Master's and PhD concurrently.

Registering for Classes

Link to Instructions for How to Register

Electronic Plans of Study

Link to Instructions for Plan of Study

BME PhD Plan of Study Worksheet

IBSC PhD Plan of Study Worksheet

MD PhD Plan of Study Worksheet

Minimum Academic Standards

There are several [resources](#) available to help with your academic success. Reach out to someone you trust either in the department or someone else on campus if you feel additional support is needed.

GPA Requirements

To be in good standing with BME and the university, students must maintain a GPA of 3.0 or above for the duration of the program. If your semester and/or your overall GPA falls under a 3.0 or if you receive a letter grade of a C or below, you and your faculty advisor will receive an academic notice letter from the BME Grad Office. If your GPA stays below a 3.0 for more than 3 consecutive semesters (not including summer), you will be dismissed from the program regardless if you are meeting the University standard. If you fall below the [University's guidelines](#), you can be dismissed from the university prior to the BME 3 semester rule.

Research Grades

- Each semester students should initiate discussions about research and performance expectations to get a satisfactory grade in research. It is highly recommended that you use the [research expectations form](#) each semester.
- For the first Unsatisfactory (U) in research, grad programs leadership will meet with the student to schedule a mediation meeting.
- If there are two (2) U's consecutively (and no more than three (3) total), student will be dismissed from the program.

Funding Implications

Many financial awards will require you to maintain a GPA of a 3.0 or better to maintain your funding. Therefore, funding may be rescinded before a dismissal from the program occurs. If you have a fellowship or other source of funding (especially outside funding), those resources may have more stringent guidelines. Always refer to your offer or award letter when evaluating your funding status.

If you feel the action taken by the BME Graduate Program is not warranted or if you have extenuating circumstances, you may follow the waiver policy in this handbook.

Responsible Conduct in Research

All BME and IBSc graduate students must satisfactorily complete the [Responsible Conduct of Research](#) requirement as outlined on the Office of Research website before the end of their first semester.

Changing Major Advisor

See APPENDIX B Student-Advisor Expectation Scales

On occasion, graduate students will need to change major professor / thesis advisor. This change may be student initiated, advisor-initiated, or may result from the advisor leaving the university. Processes and options differ for the three situations and are detailed below. Faculty members and students should review these processes and work together to have clear communication about expectations and needs when working through such a change. The Associate Head for Academic Affairs, Graduate Program Director and the Graduate Programs Office should be informed and consulted about any potential changes.

The student's thesis committee can also serve as consultants/mentors who can help guide major advisor and student through inevitable difficult conversations.

Student Initiated Major Advisor Change

Students should be aware that a change in advisor might result in:

- Limited choice of a new advisor, as fewer faculty may be available to accept students.

- Your funding could be at risk and you may need to find alternative funding resources.

- Progression through PhD program milestones and graduation may be delayed.

Students are strongly encouraged to discuss their situation directly with their major thesis advisor as early as possible to attempt to resolve any issues. If such discussions are not satisfactory then the student should engage the members of their thesis advisory committee, another trusted faculty member, Graduate Committee members, the Director of Grad Programs, or the Associate Head of Academic Programs to assist with negotiations and resolutions, depending upon how far they have progressed in the PhD program (also see *Conflict Resolution Flow Chart*).

If there is concern about confidentiality, the student should clearly ask about confidentiality prior to any conversation. Confidentiality will be maintained within BME and university guidelines. As mandatory Title IX reporters, faculty and departmental staff may be required to report situations to the Purdue Office of Institutional Equity (OIE).

If the student determines, after such consultation and attempts at resolution, that they still desire to find another research group to complete their training, potential new thesis advisors from should then be sought by the student. If students plan to stay in BME, they are strongly encouraged to participate in 2 lab rotations in the same semester that can offer a funded PhD position. If after one semester of rotations a student is not able to find a lab, alternative pathways will need to be discussed.

The student should recognize that the potential new thesis advisor may wish to discuss the situation with the current thesis advisor and other faculty. The potential new thesis advisor should ask for consent from the student prior to contacting the current thesis advisor.

Once a new thesis advisor has been identified, the student should notify Graduate Programs Office requesting a change in advisors. The Grad Programs office will then follow-up with the new advisor for confirmation and any other information that may be needed.

If a plan of study has already been approved, it is the responsibility of the student to discuss with the new advisor any revisions to courses on the plan of study or thesis advisory committee and to make the necessary changes in a timely manner.

The student should also initiate a discussion, with the current and new advisors, Graduate Programs Office staff and business office for the timing of transfer of lab and funding. Normal lab checkout procedures will apply to all transfers, including the required cleanup. Research materials including all lab notebooks, samples, equipment, and electronic data are expected to remain with the original thesis advisor unless other arrangements have been made in writing. Students may request for access or obtain copies of these materials if sanctioned by the original thesis advisor. It is the choice of the original advisor if they will allow the student to include work from their laboratory in the student's thesis or in any public presentation or publication and these requests and decisions should be discussed early and documented immediately in written form.

Advisor Initiated Major Advisor Change

When a student is not progressing academically or in research (see *Minimum Academic Standards*), a major professor/thesis advisor may initiate a separation of the student from their lab. The thesis advisor must clearly document and communicate to the student the reasons for the change and allow appropriate time for any needed improvements to meet academic or research standards. Faculty members must notify the Graduate Programs Office in writing when a student is in process of being removed from their research group. Removal from a particular lab, does not mean that you are also removed from the program. Those are two separate processes.

The student has the right and the responsibility to take an active role in seeking a new advisor, with consultation from the Associate Head of Academic Programs, Director of Grad Programs, their thesis committee members or other faculty members. No individual faculty member will be obligated to accept a student who has been removed from a different faculty member's research group.

If students plan to stay in BME, they are strongly encouraged to participate in 2 lab rotations in the same semester that can offer a funded PhD position. If after one semester of rotations a student is not able to find a lab, alternative pathways will need to be discussed.

The student should recognize that the potential new thesis advisor may wish to discuss the situation with the current thesis advisor and other faculty. The potential new thesis advisor should ask for consent from the student prior to contacting the current thesis advisor.

Once a new thesis advisor has been identified, the student should notify Graduate Programs Office requesting a change in advisors. The Grad Programs office will then follow-up with the new advisor for confirmation and any other information that may be needed.

If a plan of study has already been approved, it is the responsibility of the student to discuss with the new advisor any revisions to courses on the plan of study or thesis advisory committee and to make the necessary changes in a timely manner.

The student should also initiate a discussion, with the current and new advisors, Graduate Programs Office staff and business office for the timing of transfer of lab and funding.   Normal lab checkout procedures will apply to all transfers, including the required cleanup. Research materials including all lab notebooks, samples, equipment, and electronic data are expected to remain with the original thesis advisor unless other arrangements have been made in writing. Students may request for access or obtain copies of these materials if sanctioned by the original thesis advisor. It is the choice of the original advisor if they will allow the student to include work

from their laboratory in the student's thesis or in any public presentation or publication and these requests and decisions should be discussed early and documented immediately in written form.

Options if Major Advisor Leaves Purdue

There is no formal faculty policy regarding student options when a major advisor leaves Purdue. There are typically several different options to consider depending on the exact circumstances. Students are encouraged to consult with their thesis committee members and Associate Head for academic affairs and Director of Graduate Programs to consider options. If the student has not yet completed the Preliminary Exam, they may choose to remain at Purdue and switch to a new advisor, or may explore transfer to the new university with the Major Advisor. In the case of transfer, the Graduate Programs Office staff members can assist in transferring records. If the student has completed the Preliminary Exam, OGSPS considers them a PhD Candidate, and there are three options:

OPTION 1:

Stay at Purdue, find a new lab with a co-chair: The professor who is leaving cannot be your only committee chair, but they can be a co-chair with another BME-faculty member.

OPTION 2:

Stay at Purdue, find a new lab and a new thesis advisor This shift may require a new thesis project.

OPTION 3:

Move with the Advisor, but graduate with a Purdue PhD: OGSPS allows PhD candidates to remain as Purdue students while they complete the thesis research at another institution. Please work with the graduate programs office for the current university policy for this option.

Funding Opportunities

There are several ways for students to find funding outside of a research assistantship. These additional funding opportunities will help to bolster your CV/Resume and can help you gain valuable skills during your training. Please note that if you pursue and are awarded funding outside of BME, that funding may not meet the BME minimum requirement.

Teaching Assistantships (TA)

BME—Students must be nominated by the student's faculty advisor in order to be considered for a TA position. If you are interested in being a TA in BME, make sure you let your faculty advisor know so that they can nominate you if they feel it, is a good fit.

Outside BME—for any other teaching assignment, you will need to go directly to the school/department you would like to TA for. They should be able to instruct you on their process and if they take students from outside their own fields.

Graduate Assistantships (GA)

Students can also be funded on a GA. These positions are graduate administrative/professionals performing administrative or other duties not directly related

to teaching or research. These opportunities will be emailed to students when the Grad Programs Office is aware of them or can be listed in [Purdue's Career Website](#).

OGSPS Funding Resources

- [Funding Opportunity Databases](#)
- [Resources for Writing Fellowship Applications](#)
- [Fellowship Office](#)

Professional Development Opportunities

BME Resources

- [BMEGSA](#)—The BMEGSA hosts several workshops, speakers and symposiums to help student with their professional development each year.
- Career Coaching —Schedule an appointment with the Grad Programs Director (currently Tammy Siemers) for one-on-one coaching for skills needed in the job search
  - Resume and Job Search
  - Interviewing Skills
  - Job Negotiation
- Weekly Announcements—every Wednesday, there will be a weekly announcement sent to students which will compile many of the workshops and opportunities around campus as well as job postings each week.

Career Fairs and Center for Career Opportunities

- The Center for Career Opportunities hosts several opportunities and workshops to strengthen your job search including resume reviews, workshops, career fairs, company information sessions, current job postings etc.
- [CCO Website](#)

College of Engineering Resources

[COE Professional Development](#)

Graduate Concentrations

Students can choose to pursue a concentration along with their PhD training. You will need to look at the [website](#) to determine the concentrations approved for our program.

Internships

Internships can be a great way to gain exposure to what industry is like while gaining marketable skill sets and building your network. Regardless of whether you are interested in a career in industry or academia, an internship adds valuable training to your PhD experience. As a PhD student, the timing of an internship should be discussed with your faculty advisor early to ensure that you aren't missing any important milestones for your lab.

[Internship Instructions](#)

OGSPS Resources

[OGSPS Website](#)

Graduate Certificates

Students can choose to pursue a graduate [certificates](#) along with their PhD training to enhance their skill set. One of the most popular certificates for BME and IBSc PhD students is the [Regulatory Affairs and Regulatory Science for Medical Devices](#) certificate.

Purdue Graduate Student Government Grants

PGSG offers a wide variety of [grants](#) to students that are available for individuals and organizations.

Student Awards and Recognition

- [College of Engineering Awards](#)
- [OGSPS Graduate School Awards](#)
- BME Awards

Innovation and Entrepreneurship

[Purdue Innovates](#) is a system providing innovators support and resources for technology commercialization, intellectual property protection and venture capital.

Teaching Development and Teaching Certificates

- [Innovative Learning Programs](#)
- [College of Engineering Teaching and Learning Certificate](#)

Travel Grants

- [College of Engineering Travel Funds for PhD Candidates](#)
- [Purdue Student Government Travel Grant](#)
- [OGSPS Awarded Grants](#)

Writing Lab

[Purdue's award-winning Writing Lab offers](#) free resources including writing and teaching, research, ESL (English as a Second Language), grammar and mechanics, job search, and professional writing assistance.

Petitions for BME Programmatic Waivers

All graduate students have the right to petition for a waiver to any existing BME programmatic policy if they feel that the circumstances warrant special consideration. The student may file a petition with the BME Graduate Committee via [waiver form](#). The request will be sent to a student's faculty advisor for initial approval. If the waiver is approved by the student's faculty advisor/s, the request will then be sent on to the Grad Director for final approval. Once a

decision has been made in regards to your request, you and your faculty advisor/s will receive an email with the outcome of that decision.

Petition Deadline: You must submit the waiver in adequate timeframe for the committee to address the concern.

Student Benefits

Vacation Policy

Sick Days

Family Illness

Bereavement

Parental Leave

Medical Insurance

Benefits-Eligible Graduate Student Staff on the West Lafayette campus may be eligible for participation in a medical insurance plan sponsored by the University. Refer to the ***Graduate Staff Employment Manual*** for details.

Staff Fee Remission

Parking

Mental Health Resources

- Purdue's Counseling and Psychological Services (CAPS)
- Office of Graduate Assistance (OGA)
- The Office of the Dean of Students
- Health and Wellness Resources
- Therapy Assistance Online

Conflict Resolution Resources

College of Engineering Anonymous Reporting

Office of Graduate Assistance (OGA)

Student of Concern Report

Conflict Resolution Flow Chart

Confidentiality and Mandatory Reporting

The BME Graduate Leadership Team will provide impartial and informal assistance with reference to your concerns based on our knowledge of university policy, practice and personnel without judgement.

The information you share during any of our conversations will be handled with the highest degree of confidentiality as possible. Our office may share information about your situation with others on the Graduate Leadership Team to draw on our collective knowledge and experience. Grad office will recommend in cases where faculty mentor(s) or thesis committee should be brought in. We will not share information with others outside our office except in the following circumstances:

- with your express, written consent;
- if required by university policy to report cases of alleged research misconduct to the Research Integrity Office or the Office of the Executive Vice President for Research and Partnerships;
- if required by law to report, such as in cases in which our faculty and staff have a reasonable basis to believe that there is a risk of imminent harm to you or to others or suspected incidents of child abuse or neglect;
- if required by our role as a Title IX mandatory reporter, which requires us to report incidents of sexual discrimination, harassment, assault or exploitation, any other incident of unwelcome sexual conduct, and incidents of relationship violence or stalking.
- in instances where ISS, Sponsored programs or other administrative offices need to be aware

Acknowledgement of Indigenous Caretakers

We acknowledge Purdue University is located on the traditional homelands of the Woodland People. We honor and appreciate these indigenous caretakers which include the Bodéwadmik (Potawatomi), Lenape (Delaware), Myaamia (Miami), and Shawnee People.

Other Documents and Resources

Graduate Student Forms

Thesis and Dissertation Office

Graduate Staff Employment Manual

OGSPS Fellowships

BME Forms