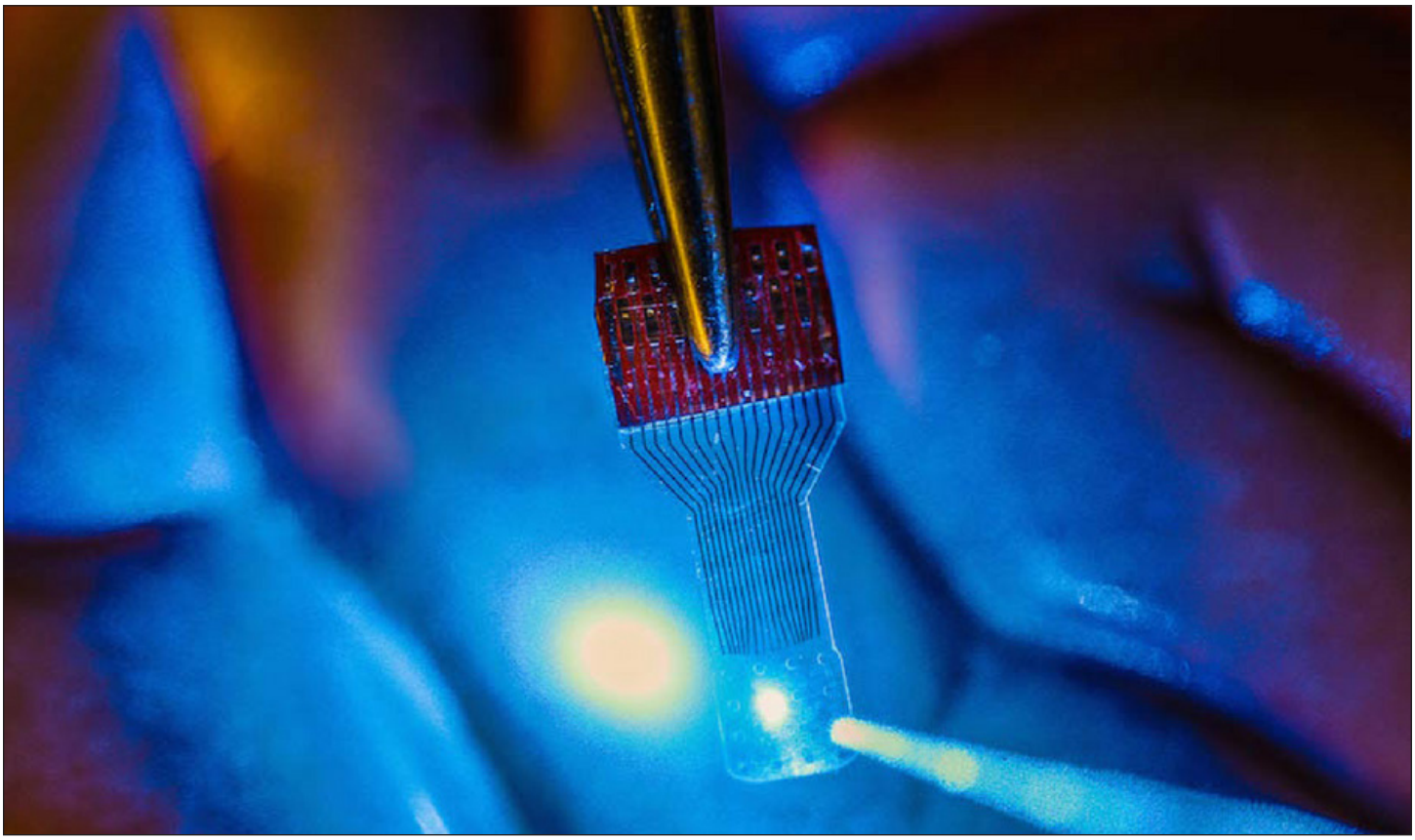
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PhD Handbook
2024–2025

updated 3/25

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The Biomedical Engineering Graduate Program

The biomedical engineering graduate program is of interest to students who wish to practice engineering or engage in medical and biological research with an engineering specialization. Graduates are employed in industry, government labs, universities and non-profit organizations.

The biomedical engineering program offers Master of Science (MS) and Doctor of Philosophy (PhD) degrees in biomedical engineering. Learn more about the MS research degree requirements in the Guide. Students who are admitted into the PhD program complete a MS degree prior to advancing to PhD candidacy. Students transferring with a MS from another program or university should discuss their individual situation with the Associate Chair of Graduate Advising to determine what additional coursework is required. A timeline of the PhD program can be found on page 6.

The program also participates in the University of Wisconsin Medical Scientist Training Program, which leads to a combined MD/PhD degree. Requirements for the MD/PhD degree are similar to the BME PhD program, although some coursework requirements will be waived using MD coursework. A timeline of the PhD portion of the MD/PhD program can be found on page 9.

The Doctor of Philosophy (PhD) degree is the highest degree conferred by the university. It is a research degree and is never conferred solely as a result of any prescribed period of study. The degree is only granted on evidence of general proficiency, distinctive attainment in a special field, and the ability for independent investigation as demonstrated in a thesis presenting original research or creative scholarship with a high degree of literary skill. The BME PhD program provides excellent opportunities for interdisciplinary coursework and research. To receive a PhD, a student must complete 30 credits of research beyond the MS degree. Because of the different technical requirements for various specialties, the PhD is administered on a degree-by-committee basis.

All policies from the Graduate School's Academic Policies and Procedures document apply to BME graduate students; including protections from harassment, accommodation for disabilities, etc. Student questions and concerns regarding the program can be directed to the Associate Chair of Graduate Advising.



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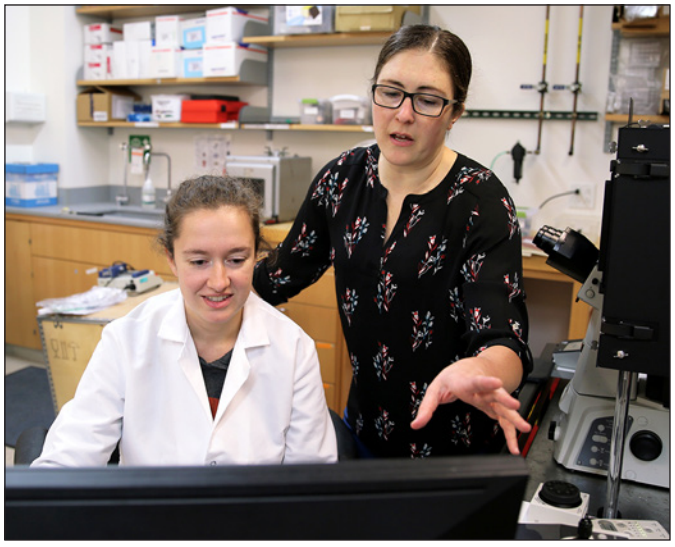
Timetable for BME PhD Students

	Program Milestones	Coursework Milestones
Year 1: Semester 1	Identify Faculty Advisor	BME 703: Responsible Conduct in Research
Year 1: Semester 2		
Year 2: Semester 3	Qualifying Exam: Depth	
Year 2: Semester 4	Qualifying Exam: Breadth	Coursework complete including PhD minor; MS degree filing
Year 3: Semester 5		
Year 3: Semester 6	Preliminary Exam	
Year 4: Semester 7		
Year 4: Semester 8	Annual committee review	
Year 5: Semester 9		
Year 5+: Semester 10+	Annual committee review until thesis defense	
Semester of defense	Schedule exit interview	

Finding an Advisor

All graduate students need to identify a faculty advisor or co-advisor with a BME affiliation **within the first semester** of matriculation. Some students will have been directly admitted to an advisor's group while others will participate in the rotation program (page 15). A faculty advisor provides the student with academic guidance in their course program and research oversight in their thesis — for most RA this will be the faculty member that provides funding. The advisor must be a primary BME faculty or a BME affiliate; if the advisor is a BME affiliate, the student must identify a primary BME faculty to serve as co-advisor.

If there are questions, direct them to the Associate Chair of Graduate Advising. More information about the expectations for student-advisor relationships can be found on page 14. If a change in advisor is necessary for any reason, please see the information on page 16.



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Timetable for BME PhD Students

PhD Course Requirements

A total of 60 credits, including:

- A minimum of 25 credits of coursework that fulfill a PhD Track (page 20-25) and PhD Minor (page 26)
- A minimum of 30 credits of research (i.e., only BME 790, 890, 990)

More information about registration can be found on page 17. A general course load is two courses per semester, but this is flexible. Students transferring with a MS from another program or university should see page 19 to learn about the process to transfer credits.

Qualifying Exams

The qualifying exams consist of a depth and breadth exam. Each PhD student arranges a date before the end of their 3rd semester with their Qualifying Examination committee to take the depth exam. The breadth exam occurs the semester after the student has passed the depth exam.

Students may retake either the depth or the breadth exam one time. For the depth exam, the retake must take place in the next semester. For the breadth exam, the retake must occur within two months of the original breadth exam. All qualifying exams must be completed prior to the start of the fifth semester. More information on the qualifying exam can be found on page 28.

Filing for MS Degree

Students file for a MS degree once they have completed 6 credits of research and 24 credits of course work that include:

- At least 12 credits of engineering courses, 400-level or above
- At least 15 credits in one area of specialization, 400-level or above
- At least 15 credits that are graduate level (see page 17 for more details)

Note that these requirements are not identical to those listed as PhD course requirements. If a PhD student elects to graduate with a MS degree and not pursue their PhD training, they may use either criteria; students that intend to pursue the PhD training must follow the PhD–specific guidelines (which will automatically fulfill the MS requirements).

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Timetable for BME PhD Students

Preliminary Exam

The Preliminary Examination is an oral examination based upon a student's written proposal and consists of a detailed plan to carry out the PhD thesis. Students must take their preliminary within one year of passing the Qualifying Exams, and at least 18 months before their final defense. More information on the Preliminary Exam can be found on page 31.

Students who pass the Preliminary Examination achieve dissertator status the following semester. Dissertators enroll in only three research credits each semester and work towards completing their thesis project.

Annual Reviews

Students will meet with their thesis committee each year until the completion of the program to determine that they are maintaining satisfactory progress. The student will arrange this meeting, which consists of a short presentation of progress since the last meeting and discussion with the committee. The student will report the committee's decision (satisfactory/unsatisfactory progress) to the Graduate Student Services Coordinator by email (with their advisor cc'd).

In addition, each year the advisor and student will complete the College of Engineering GOAALS Assessment and arrange a meeting to discuss their individual development plan (IDP) with their advisor.

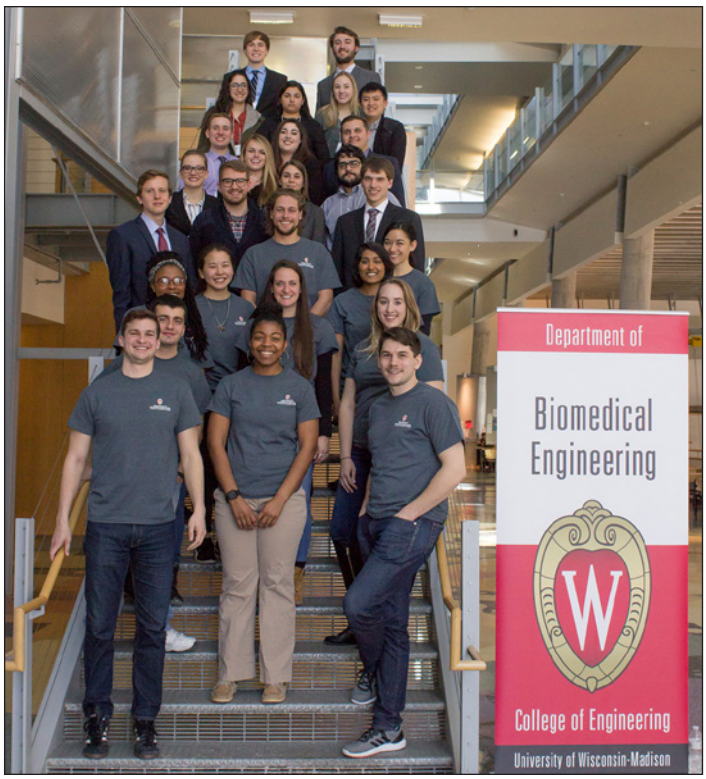
Defense

The Defense is an oral examination based upon a student's thesis. Doctoral students have a maximum of five years from the date of passing their preliminary examinations to take their final oral examination and submit their dissertation. More information on the thesis defense can be found on page 32.

Leave Policies

RA and TA leave is described in the Graduate School's Academic Policies and Procedures.

Parental Leave is provided under a policy approved by the College of Engineering, please discuss the specifics of your situation with the BME Payroll and Benefits Specialist. Program timeline requirements will be adjusted as needed for extended leaves (>4 consecutive weeks).



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Timetable for BME MD/PhD Students

The MD/PhD is an accelerated program compared to the PhD, with the goal of completing the thesis in three or four years. This process starts during medical school, in cooperation with the Medical Science Training Program (MSTP).

	Program Milestones	Coursework Milestones
Year 0: Semester 2	Identify Faculty Advisor	8 credits research (BME 890)
Year 0: Summer		2 credits research (BME 890)
Year 1: Semester 1		8 credits of required courses (including BME 703: Responsible Conduct of Research)
Year 1: Semester 2	Qualifying Exam: Depth	5-6 credits of required courses 2-3 credits research (BME 890)
Year 1: Summer	Qualifying Exam: Breadth	2 credits research (BME 890)
Year 2: Semester 3	Preliminary Exam	2-3 credits of required courses 5-6 credits research (BME 890) MS degree filing
Year 2: Semester 4		3 credits research (BME 990)
Year 2: Summer	Annual committee review	3 credits research (BME 990)
Year 3: Semester 5		3 credits research (BME 990)
Year 3: Semester 6	Target for thesis defense	3 credits research (BME 990)
Semester of defense	Schedule exit interview	

Finding an Advisor

All graduate students need to identify a faculty advisor or co-advisor with a BME affiliation **within the first semester** of matriculation. For MD/PhD students, this is accomplished through rotations under MSTP. A faculty advisor provides the student with academic guidance in their course program and research oversight in their thesis — for most RA this will be the faculty member that provides funding. The advisor must be a primary BME faculty or a BME affiliate; if the advisor is a BME affiliate, the student must identify a primary BME faculty to serve as co-advisor.

If there are questions, direct them to the Associate Chair of Graduate Advising. More information about the expectations for student-advisor relationships can be found on page 14. If a change in advisor is necessary for any reason, please see the information on page 16.

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Timetable for BME MD/PhD Students

PhD Course Requirements

- A minimum of 16 credits of coursework that fulfill a PhD Track (page 20-25) and PhD Minor (page 26). Note that the track for MD/PhD students is different from the PhD.
- A minimum of 30 credits of research (i.e., only BME 790, 890, 990)

More information about registration can be found on page 17. A general course load is two courses per semester, but this is flexible. Students transferring with a MS from another program or university should discuss their individual situation with the Associate Chair of Graduate Advising to determine course requirements.

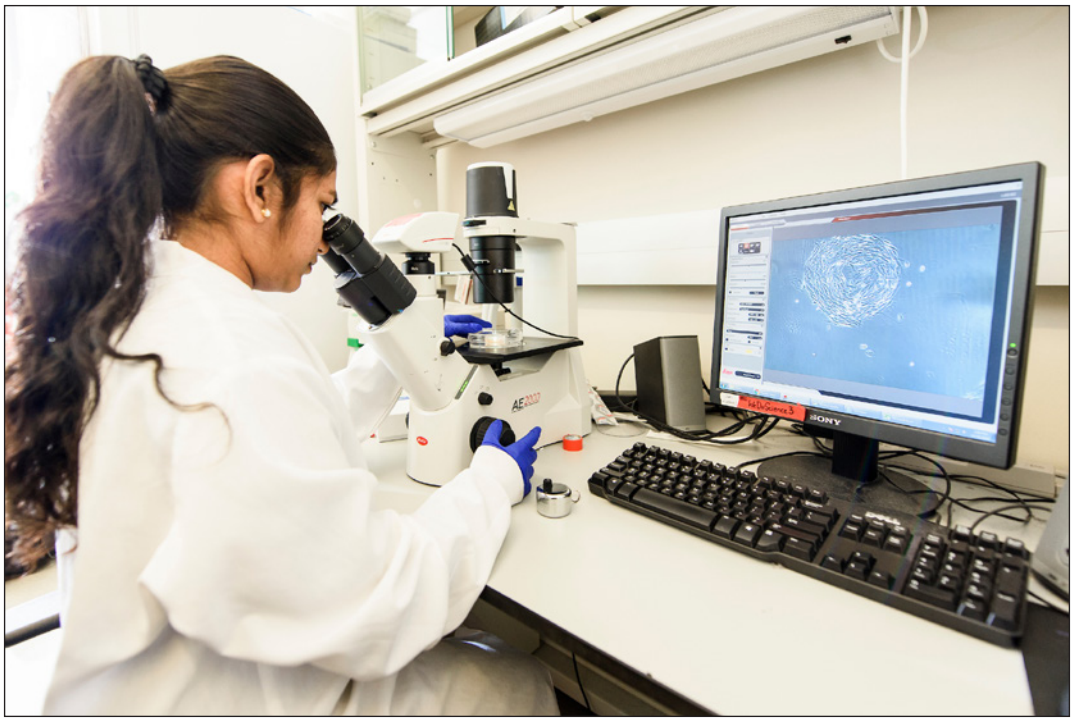
Qualifying Exams

The qualifying exams consist of a depth and breadth exam. Each MD/PhD student arranges a date with their Qualifying Examination committee to take the depth exam. The breadth exam occurs the semester after the student has passed the depth exam.

Students may retake either the depth or the breadth exam one time. For the depth exam, the retake must take place in the next semester. For the breadth exam, the retake must occur within two months of the original breadth exam. While exact timelines will vary, all qualifying exams must be completed prior to the start of the 5th semester at the latest.

Filing for MS Degree

Students may file for a MS degree once they have completed 16 credits of coursework (including the 12 credits of engineering coursework) and 14 credits of research.



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Timetable for BME MD/PhD Students

Preliminary Exam

The Preliminary Examination is an oral examination based upon a student's written proposal and consists of a detailed plan to carry out the PhD thesis. Students must take their preliminary within one year of passing the Qualifying Exams, and at least 18 months before their final defense. More information on the Preliminary Exam can be found on page 31.

Students who pass the Preliminary Examination achieve dissertator status the following semester. Dissertators enroll in only three research credits each semester and work towards completing their thesis project.

Annual Reviews

Students will meet with their thesis committee each year until the completion of the program to determine that they are maintaining satisfactory progress. The student will arrange this meeting, which consists of a short presentation of progress since the last meeting and discussion with the committee. The student will report the committee's decision (satisfactory/unsatisfactory progress) to the Graduate Student Services Coordinator by email (with their advisor cc'd).

In addition, each year the advisor and student will each complete the College of Engineering GOAALS assessment and arrange a meeting to discuss their individual development plan (IDP) with their advisor.

Defense

The Defense is an oral examination based upon a student's thesis. Doctoral students have a maximum of five years from the date of passing their preliminary examinations to take their final oral examination and submit their dissertation. More information on the thesis defense can be found on page 32.

Leave Policies

RA and TA leave is described in the Graduate School's Academic Policies and Procedures.

Parental Leave is provided under a policy approved by the College of Engineering, please discuss the specifics of your situation with the BME Payroll and Benefits Specialist. Program timeline requirements will be adjusted as needed for extended leaves (>4 consecutive weeks).

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Arriving on Campus

Upon arrival, students should review campus guidelines and complete the following tasks to make sure that their time on campus starts smoothly.

Obtain a Wiscard

The student ID, or Wiscard, is the key to campus life. Students use their Wiscards as a library card, to purchase school supplies and food on campus, as a key card for certain buildings that faculty grant them access to, and more. Having a Wiscard is a prerequisite for many activities on campus, so it is essential that students stop by the Wiscard Office in Union South Room 149 between 8:30 a.m. and 5 p.m. Monday–Friday as soon as possible after arriving in Madison. In order to receive a Wiscard you must present some form of personal photo identification such as a valid passport or U.S. driver's license.

Navigate Campus

Students can explore the UW campus via map online before setting out on foot, bike, bus, or car. The Associated Students of Madison (ASM) provide students with a free bus pass. Transportation Services can be referenced for bus routes and all other transportation services available.

Verify Contact Information and Online Logins

To be sure that they can connect with fellow students and campus offices, students should verify that they can log in to their MyUW account and confirm their mailing address and phone number. The campus information technology division, known as DoIT, should be contacted through the DoIT Help Desk if students encounter any difficulties accessing MyUW.

Each student's NetID will allow them to log in to a personalized, secure BOX folder at the beginning of their program. This folder will allow the student to exchange information with their advisor(s) regarding their academic plan. Students will maintain digital versions of their degree program planning forms for each semester of their program here.



Pay Tuition and Fees

Student account invoices are sent by mail and updated in MyUW each semester. Questions can be directed and payments made to the Bursar's Office in person on East Campus Mall or online. For students with a TA or RA position, tuition will be paid automatically. Any difficulties should be reported immediately to your faculty advisor.

Check In with International Student Services

International students who are on a student scholar or visa must check in with International Student Services at the Red Gym ***immediately upon arrival***.

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BME Departmental Graduate Expectations

The process to earning a PhD is a unique experience for each student — as such, it can at times be confusing to know what is expected from the student, their advisor, and their PhD program. Therefore, the BME program has assembled a set of expectations that we hope will assist each student to navigate this process. Individual advisors are also encouraged to outline their expectations for their mentees; however, the expectations outlined here supersede these in cases of disagreement.

First, we would remind students of the BME PhD program educational outcomes:

1. Demonstrate an ability to synthesize knowledge from a subset of the biological and physical sciences.
2. Conduct original research.
3. Demonstrate an ability to create new knowledge and communicate it to their peers.
4. Foster ethical and professional conduct.

In order to obtain a PhD, you will be expected to reach these outcomes and demonstrate your progress through your qualifying exams, preliminary exam, annual committee meetings, and thesis/thesis defense.

What We Expect From You

You will become familiar with the requirements for completing your graduate degree (overview timetable is on page 6 or 9). If you have questions, you should raise them with the Graduate Student Services Coordinator, your advisor, or the Associate Chair of Graduate Advising as early in your career as possible.



You will enroll in the required Responsible Conduct of Research course in your first year on campus (offered in fall only). This course will provide more information on the following expectations:

- You will conduct your research ethically and with integrity.
- You will work safely in the lab. Before beginning in the lab, you must complete appropriate safety training.
- You will remember that data belongs to the lab, not to any one individual. Your original notebooks and files will remain when you leave the lab.

You will participate in BME graduate and faculty recruiting for a minimum of three years. This effort will enable us to build a strong community of fellow researchers.

You will be respectful, tolerant, and work collegially with BME students, faculty, and staff and will not participate in harassment, bias, or hostile/intimidating behavior.

You will participate in the annual GOAALS (Graduate online assessment and achievement learning system) in CoE.

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BME Departmental Graduate Expectations

What You Can Expect From the BME Program

We will provide an environment that is intellectually stimulating, supportive, safe, and free from harassment, bias, and hostile/intimidating behavior.

If you are concerned about your interactions with your PhD advisor or your research progress, the Associate Chair of Graduate Advising and/or the BME Chair will work with you to resolve the situation:

- If this concern is brought about by the PhD advisor not meeting the expectations below, please report this to the Associate Chair of Graduate Advising, the Assistant Dean for Graduate Affairs in the CoE, the Chair, or the Grievance Committee. These groups will work together to help remedy the situation or help you find a new lab (through rotations if desired).
- If this concern is brought about by a change in research interests, please discuss this first with your PhD advisor to determine if there is an immediate solution (e.g. change in project in the lab, working with a collaborator). If there is no immediate solution, you should next meet with the Associate Chair of Graduate Advising who will work with you to identify a new lab. It is expected that you will take an active role in this process to find a new lab within one semester.

Once you have earned your PhD, you will always be an alum of our department. As such, the department is always available to confirm that you have earned this degree.

What You Can Expect From Your PhD Advisor

- They will be respectful, tolerant, and work collegially with you.
- They will help you to identify an initial research direction during your first year.
- They will identify the safety training that you must complete.
- They will meet with you to discuss research progress on a regular basis.
- They will participate in the annual GOALLS assessment through CoE and meet with you annually to discuss your Individual Development Plan (IDP).
- They will help you to attend local/regional meetings, and at least one national meeting during your PhD.

About Your RA/PA/TA Position

These positions are fully defined in the Graduate School's Academic Policies and Procedures. Note in particular: "It is understood that RAs are engaged in professional activities of such a nature that the output produced or the result accomplished cannot be precisely measured in relation to a given period of time."

As part of your position as a researcher in a lab, it is reasonable for you to have some lab-associated duties (e.g., ordering, maintaining equipment, training new students). If you feel these duties are excessive, you should discuss this with your PhD advisor. If this does not resolve the situation, you should then discuss your concerns with the Associate Chair of Graduate Advising and/or the BME Grievance Committee.

RA/PA/TA funds do not oblige you to participate in any activities outside of UW–Madison (e.g., babysitting, helping a faculty member with personal chores). If you are pressured to do activities of this sort, you should report this to the Assistant Dean for Graduate Affairs in CoE.

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Rotations

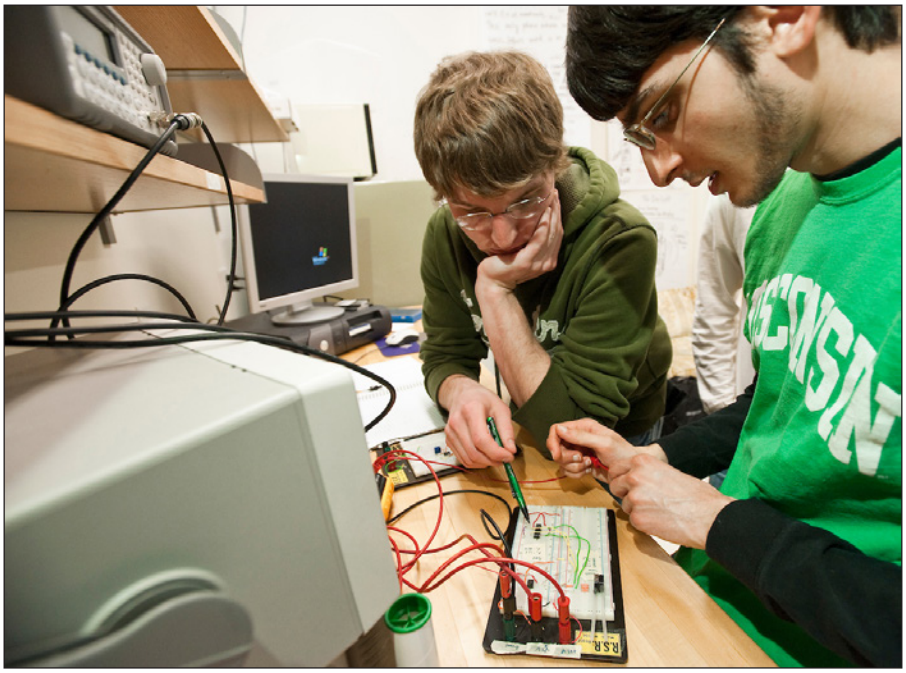
While some students will already know which advisor they want to do their thesis with, the BME department offers the option of rotations for incoming students. Rotations are particularly useful for students that are interested in multiple labs or those who want to gain exposure to new topics/methods. During the rotation, the official advisor is the Associate Chair of Graduate Advising. The rotation period lasts most of the first semester, after which students are placed with their advisor. The general schedule is:

Orientation
During new student orientations, faculty with open rotations will give short research talks. Students will have a few days to consider projects and have follow up meetings. Students must request a rotation in the lab and determine the order of their three rotations. Once a student has finalized this plan, they will report it to the Associate Chair of Graduate Advising.

Rotations
Each rotation will last 3-4 weeks. This is a short timeframe, so students will want to spend as much time as possible in the rotation lab to determine if the scientific questions, advisor mentoring style, and group environment are a good fit.

Selection
Students and advisors will turn in ranked preferences to the Associate Chair of Graduate Advising before Thanksgiving and matches will be made. Students will then start in their lab and switch their advisor on record.

Additional Rotations
If a student does not find a good match, additional rotations can be done during winter break and spring semester. Financial support during extended rotations will require the student to TA during the spring semester. If a student fails to match by the end of the second semester, they must switch to a MS degree or choose to leave the university. This decision can be appealed to a committee composed of the Associate Chair of the PhD Program, the Chair of the Department, and one of the rotation advisors (selected by the student). The decision of this committee is final.



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Process to Change Your Advisor

On occasion, there are situations where a student requests to switch to a different faculty research advisor to conduct their thesis work. Sometimes these changes are motivated scientifically – perhaps your interests changed. Other times they are motivated by personal concerns related to the advisor/student relationship or group atmosphere. No matter the circumstances, a graduate student does not have to remain linked permanently to a faculty advisor. As described in the UW-Madison Graduate School policies:

> "The advisor/student relationship is one of mutual agreement, which may be terminated by either party. If a student changes advisor, they need to notify their program coordinator. It is the responsibility of every graduate student to have an advisor."

In cases where an advisor or environment does not meet the expectations of the College of Engineering, your immigration status and salary will not be impacted during the process of finding a new project. As you consider this change:

- If you are comfortable, have conversations with your faculty advisor. This is often the appropriate strategy when your change is scientifically motivated. Discuss the reasons you are considering a change and see if there are solutions that you and your faculty advisor can implement to either allow you to stay in the lab or help you identify a new laboratory. You will want to be certain that your conversations are sufficiently clear, and if you feel it would be useful you can involve an outside party such as a committee member or faculty member you have had a positive interaction with. If you ultimately decide to switch to a new lab, you will need to report this change to the Associate Chair of Graduate Advising.

- Alternatively, if you are not comfortable having the conversation with your faculty advisor for any reason, you should contact the Associate Chair of Graduate Advising or the Assistant Dean for Graduate Affairs in the College of Engineering to set up a meeting and discuss your individual situation. This is usually the appropriate course of action when your change is motivated by concerns with the advisor/student relationship or group atmosphere. They will have this conversation with you without involving your faculty advisor either until you are ready or if necessary, without involving your faculty advisor at all.

Points to consider during a transition:

- It may take time to identify a new faculty advisor—you want to do your diligence to be sure you land in a good situation.
- Changing advisors can be stressful - reach out to UHS if speaking with a counselor would be helpful.
- You may need to develop a plan for completing any remaining work with your current advisor.
- Remember, the department is invested in your success and well-being. We will work with you through this process.

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Class Registration and Credit Load

Course registration is accessed online through MyUW in Course Search & Enroll. A Net ID and password are required for log in. Tutorials on navigating Student Center are available through the enrollment webpage.

The minimum credit load to be considered a graduate student is two graduate-level credits. A student (non-dissertator) taking 2-6 credits during the fall or spring semester is considered a part-time graduate student. The below credit load requirements apply to full-time graduate students. When enrolling, students should remember both the credit load requirements for their status as a graduate student (and, if applicable, their position as a RA/TA/PA) as well as the types and levels of courses needed to complete their degree.

Credit Load Requirements for Full-Time Students

	Fall and Spring Semester	Summer Session
General Rule	8-15 Credits	4-8 Credits
Dissertators	3 Credits	3 Credits
Non-dissertator TAs and RAs with >33%	8 Credits	2 Credits
International Students	8-15 Credits	Not required (unless being paid)

Fall and Spring

A student taking 8-15 credits during the fall or spring semester is considered a full-time graduate student. The maximum credit load for fall and spring semester is 15 graduate-level credits. (Note: taking more than 12 credits per semester is not recommended.) Students who are being paid as an RA, TA or PA must be enrolled as a full-time student.

Summer

Enrollment for summer is not required for graduate students. However, it is required for any student who is being paid as an RA. During the summer, students who are required to enroll must take at least 2 credits.

Dissertators

Dissertator status, which is granted the semester following the completion of the Preliminary Exam, allows a student to enroll for only 3 credits while being considered a full-time student. To maintain dissertator status, students must enroll in exactly 3 credits each semester. For more information on dissertator status, please see the Graduate School's Academic Policies and Procedures.

****PLEASE NOTE:** Courses taken pass/fail, for audit, or below 300 do not count towards these minimums or maximums. They are in essence counted as zero credits. Students cannot take courses pass/fail or for audit while having dissertator status. Graduate level courses are either greater than 700 level **or** have a designation as having a "50% graduate coursework requirement" in the course guide. Questions about a specific course should be directed to the Graduate Student Services Coordinator.

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Class Registration and Credit Load

Unique Registration Situations

Each student's program plan is unique and may require additional steps for registration or coursework documentation; the following are the most common scenarios that students encounter during registration and the processes to follow regarding proper registration.

Carrying a Credit Overload
In order to enroll in more than the maximum credit load, students must submit a Credit Overload Request form, have it signed by their faculty advisor, and return it to the Graduate School at 217 Bascom Hall. The request must be approved by the Add Deadline in order for a student to take more than the max credit load; the student is responsible to add the overload course.

Registering for a Closed BME Class
To register for a waitlisted BME course (▲), students should use the waitlist system. To register for a closed BME course (■), students should contact the instructor of the course with their campus ID, course number, and number of the lab/ discussion section (if needed). An online instruction demo on how to use the waitlist can be found here.

Registering for Graduate Level Independent Study, Research or Thesis Credits
BME students interested in a BME PhD level independent study course (BME 999) should contact the instructor for permission during the general enrollment periods. The instructor must email the BME Graduate Student Services Coordinator with the following information: student name, student campus ID number, and authorization to enroll. Students will be notified via email when authorization has been granted.

BME students interested in the other BME research credits (BME 799, 790, 890, and 990) should enroll in the appropriate course and faculty member section during the general enrollment periods. It is the student's responsibility to enroll with the correct course and faculty member section. Incorrect enrollment may result in an incomplete or unsatisfactory grade. The faculty section is generally the student's advisor. In the case of co-advised students, credit should be split between advisors each semester as appropriate (note: this is not required in cases where a primary BME faculty is serving as as a co-advisor to support advisor that are affiliates.).

- BME 799: Master's level independent study
- BME 790: Master's level thesis
- BME 890: PhD level research–pre-dissertator, before preliminary exam
- BME 990: PhD level research–dissertator, after preliminary exam
- BME 999: PhD level independent study–dissertator, after preliminary exam

Requesting Transcripts

Students can order "unofficial" transcripts at any time by following the instructions listed here. Official transcript orders can be placed here.

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Transferring Credits

Math requirement
Several PhD tracks have a math requirement that can be waived by a B- or better in the equivalent course in undergraduate. To request this waiver, please email the Associate Chair of Graduate Advising a copy of your unofficial transcript and indicate the course you are proposing to use. The credits do not transfer; you will instead be able to take a free elective.

BS earned at UW-Madison
Students may transfer up to 6 credits of their undergraduate coursework (400-level+).

MS earned at UW-Madison

- Students who have earned a MS in BME can transfer their courses directly towards the PhD Track requirements. The MS courses alone might not fulfill all of the PhD course requirements; there will likely be some courses needed to complete the track requirements and to reach the 32 credit minimum needed to advance to dissertator status.
- Students who have earned a MS degree in another field at UW-Madison should contact the Associate Chair of Graduate Advising to understand remaining course requirements. A maximum of 7 credits can be counted from a separate MS degree.
- Master's degree students who have been absent for five or more years lose all degree credits earned before their absence. See the relevant grad school policy here.
- All students with a prior MS degree will need to complete the Qualifying Exams and Preliminary Exam requirements even if coursework requirements have been met. Please discuss your specific plan with the Associate Chair of Graduate Advising.

MS earned at another institution

- If the previous degree was a MS in BME the program may transfer up to 18 credits of PhD track coursework requirements. Students must fulfill the remaining track requirements and meet the 32 credit minimum at UW-Madison in order to advance to dissertator status (research credits count towards this minimum).
- Those with a MS in other fields can earn a MS in BME at UW-Madison; only 7 credits of coursework will be transferred in this case.
- All students with a prior MS will still need to complete the Qualifying Exams and Preliminary Exam but may be able to do so at an accelerated pace.
- MS degree credits earned five or more years prior to the initiation of the PhD program cannot be transferred.
- To transfer credits, students should develop a list of course equivalents between their chosen track and crses taken at their prior institution (ex: I took Math 456 Linear Algebra, which I believe is equivalent to Math 443: Applied Linear Algebra at UW-Madison). This list, the syllabi for all courses from the prior institution, and a copy of the unofficial transcript should be provided to the Associate Chair of Graduate Advising for determination of equivalence.

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PhD Track: Biomaterials and Tissue Engineering

Biomaterials and tissue engineering employ a varied range of approaches to develop methods to diagnose and treat diseases, create living tissue environments that may be used to restore the function of a damaged organ, and uncover biological mechanisms related to tissue development and disease. Graduate students trained in biomaterials and tissue engineering are expected to gain a detailed understanding of cellular and molecular biology, materials science, and engineering methods relevant to their research focus.

Courses	PhD		MD/PhD	
	cr.	50% grad. cr	cr.	50% grad. cr
BME 701–Seminar	2	2	2	2
BME 703–Resp. Cond. of Res.	2	2	2	2
Track-specific coursework				
Engineering	9	—	9	—
Biology	3	—		
Data analysis	3-4	—	3	—
Electives	6	—		
Total	28-29	at least 15	16	at least 10

Biology:
CRB 640: Fundamentals of Stem Cell and Regenerative Biology
CRB 650: Molecular and Cellular Organogenesis
M M & I/PATH-BIO528: Immunology
ZOOLOGY 570: Cell Biology

Data Analysis:
BMI/STAT 541: Introduction to Biostatistics
BMI/COMP SCI 776: Advanced Bioinformatics
COMP SCI 765: Data Vizualization
STAT/F&W ECOL 571: Statistical Methods for Bioscience I
STAT/BMI 877: Statistical Methods for Molecular Biology

Engineering:
BME/ PHM SCI 430: Biological Interactions with Materials
BME 510: Introduction to Tissue Engineering
BME 511: Tissue Engineering Laboratory
BME 520: Stem Cell Bioengineering
BME 545: Engineering Extracellular Matrices
BME 550: Introduction to Biological and Medical Microsystems
BME 602: CRISPR Genome Editing and Engineering Laboratory
CBE 540: Polymer Science and Technology
CBE 562: Cellular Biomanufacturing
CBE 648: Synthetic Organic Materials in Biology and Medicine
CBE 781: Biological Engineering: Molecules, Cells and System
MS&E 521: Advanced Polymeric Materials

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PhD Track: Biomechanics

Biomechanists use experiments and computational tools to investigate the mechanical aspects of biological systems, at levels ranging from whole organisms to organs, tissues, and cells. Graduate students trained in biomechanics are expected to gain a detailed understanding of mechanics, mathematics, biology, and engineering relevant to their research focus.

Courses	PhD		MD/PhD	
	cr.	50% grad. cr	cr.	50% grad. cr
BME 701–Seminar	2	2	2	2
BME 703–Resp. Cond. of Res.	2	2	2	2
Track-specific coursework				
Mechanics	12	—	12	—
Biomechanics	6-12	—	6-12	—
Advanced Mechanics	0-6	—	0-6	—
Biosciences	3-5	—		
Electives	6	—		
Total	28-30	at least 15	16	at least 10

Biomechanics:
BME/ME 414: Orthopaedic Biomechanics–Design of Implants
BME/ME 415: Biomechanics of Human Movement
BME/ME 505: Biofluidics
ME/BME 516: Finite Elements for Biological and Other Soft Materials
BME/ME 603: Image-Based Biomechanics
BME/ME 615: Tissue Mechanics
BME/ME 715: Advance Tissue Mechanics

Biosciences:
ANAT&PHYS 335: Physiology
ANAT&PHYS 435: Fundamentals of Human Physiology
BIOCHEM/GENETICS/MD GENET 620: Eukaryotic Molecular Biology
CRB/BME 670: Biology of Heart Disease and Regeneration
KINES 773: Cardiorespiratory Adaptations to Enviroment and Exercise
ZOOLOGY 570: Cell Biology

Advanced Mechanics:
ME 440: Intermediate Vibrations
ME/CIV ENGR/EMA 508: Composite Materials
ME/EMA 540: Experimental Vibration and Dynamic System Analysis
ME 563: Intermediate Fluid Mechanics
ME/EMA 570: Experimental Mechanics
ME 573: Computational Fluid Dynamics
EMA 506: Advanced Mechanics of Materials I
EMA 519: Fracture Mechanics
EMA/MS&E 541: Heterogeneous and Multiphase Materials
EMA 545: Mechanical Vibrations
EMA 605: Introduction to Finite Elements
EMA/EP 615: Micro- and Nanoscale Mechanics
EMA 630: Viscoelastic Solids
EMA 700: Theory of Elasticity
EMA 710: Mechanics of Continua

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PhD Track:
Biomedical Imaging and Optics

Biomedical imaging and optics research develops and utilizes new experimental and computational tools to characterize tissue structure across multiple size scales. A particular focus is on human health, especially with respect to achieving superior diagnostic/prognostic tools for a spectrum of diseased states. Graduate students trained in this track are expected to gain a detailed understanding of mathematics, biology and engineering as well as optical and/or physical methods relevant to their research focus.

Courses	PhD		MD/PhD	
	cr.	50% grad. cr	cr.	50% grad. cr
BME 701–Seminar	2	2	2	2
BME 703–Resp. Cond. of Res.	2	2	2	2
Track-specific coursework				
Engineering	9	—	9	—
Biology	3-5	—		
Data analysis	3	—	3	—
Math*	3	—		
Electives	3	—		
Total	28-30	at least 15	16	at least 10

**Math can be waived for students that have taken all equivalent courses as an undergraduate/ MS student (with a B- or better). In that case the student will take 6 credits of electives.*

Mathematics:
Math 443: Applied Linear Algebra

Biology:
ANAT & PHYS 335: Physiology
BIOCHEM 501: Introduction to Biochemistry
ZOOLOGY 570: Cell Biology

Data Analysis:
BME/MED PHYS 574: Data Science in Medical Physics
COMP SCI 319: Data Science Programming I for Research
COMP SCI/ECE/ME 532: Matrix Methods in Machine Learning
COMP SCI 766: Computer Vision
COMP SCI/BMI 767: Computational Methods for Medical Image Analysis

Engineering:
BME/MED PHYS 573: Mathematical Methods in Medical Physics
BME/MED PHYS 578: Non-Ionizing Diagnostic Imaging
BME 651: Biophotonics Lab
BME/MED PHYS/PHMCOL-M/PHYSICS/RADIOL 619: Microscopy of Life
BME/MED PHYS 710: Advances in Medical Magnetic Resonance
BME/CHEM/MED PHYS 750: Biological Optical Microscopy
BME 751: Biomedical Optics and Biophotonics
BME 780: Methods in Quantitative Biology
MED PHYS/BME/H ONCOL/PHYSICS 501: Radiation Physics and Dosimetry
MED PHYS/BME 580: The Physics of Medical Imaging with Ionizing Radiation
MED PHYS 777: Principles of X-Ray Computed Tomography

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PhD Track:
Medical and Microdevices

Medical and microdevices involve the use of electronic and computational tools to develop devices used in diagnosis and treatment of disease ranging from the systemic to the cellular and molecular levels.

Courses	PhD		MD/PhD	
	cr.	50% grad. cr	cr.	50% grad. cr
BME 701–Seminar	2	2	2	2
BME 703–Resp. Cond. of Res.	2	2	2	2
Track-specific coursework				
Engineering	9	—	9	—
Biology	3-5	—		
Data analysis	3-4	—	3	—
Math*	3	—		
Electives	3	—		
Total	28-30	at least 15	16	at least 10

**Math can be waived for students that have taken all equivalent courses as an undergraduate/ MS student (with a B- or better). In that case the student will take 6 credits of electives.*

Mathematics:
MATH 443: Applied Linear Algebra
MATH 519: Ordinary Differential Equations
MATH 619: Analysis of Partial Differential Equations

Biology:
ANAT & PHYS 335: Physiology
BIOCHEM 501: Introduction to Biochemistry
BIOCHEM/GENETICS/MICROBIO 612: Prokaryotic Molecular Biology
BIOCHEM/GENETICS/MD GENETICS 620: Eukaryotic Molecular Biology
PATH 750: Cellular and Molecular Biology/Pathology
PATH 752: Cellular and Molecular Biology/Pathology Seminar
ZOOLOGY/PSYCH 523: Neurobiology
ZOOLOGY 570: Cell Biology

Data Analysis:
BMI/STAT 541: Introduction to Biostatistics
BMI/STAT 542: Introduction to Clinical Trials I
BMI/COMP SCI 576: Introduction to Bioinformatics
BMI/COMP SCI 776: Advanced Bioinformatics

Engineering:
BME/ECE 462: Medical Instrumentation
BME/MED PHYS 535: Intro to Energy-Tissue Interactions
BME 550: Introduction to Biological and Medical Microsystems
BME 602: Introduction to Neuroengineering
BME 640: Medical Devices Ecosystem: Path to Product
BME 651: Biophotonics Lab
BME/CHEM/MED PHYS 750: Biological Optical Microscopy

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PhD Track: Neuroengineering

Neuroengineering is the convergence of neuroscience, computation, device development, and mathematics to improve human health. Neuroengineering brings together state-of-the-art technologies for the development of devices and algorithms to assist those with neural disorders. It is also used to reverse engineer living neural systems via new algorithms, technologies and robotics. Students pursing this track are involved in all of these endeavors so that as the next generation of engineers, they will transcend the traditional boundaries of neuroscience, technology, engineering and mathematics.

Courses	PhD		MD/PhD	
	cr.	50% grad. cr	cr.	50% grad. cr
BME 701–Seminar	2	2	2	2
BME 703–Resp. Cond. of Res.	2	2	2	2
Track-specific coursework				
Engineering	9	—	9	—
Biology	3	—		
Data analysis	3	—	3	—
Electives	6	—		
Total	28	at least 15	16	at least 10

Data Analysis:
COMP SCI 319: Data Science Programming I For Research
COMP SCI/ECE/ME 532: Matrix Methods in Machine Learning
COMP SCI/ECE 533: Image Processing
COMP SCI/BMI 567: Medical Image Analysis

Engineering:
BME 520: Stem Cell Bioengineering
BME 550: Introduction to Biological and Medical Microsystems
BME 602: Introduction to Neuroengineering
BME 640: Medical Devices Ecosystem: Path to Product
ECE/BME 462: Medical Instrumentation
ECE/BME 463: Computers in Medicine

Biology:
KINES 721: Neural Basis for Movement
KINES 861: Principles of Motor Control and Learning
NTP/NEURODPT 610: Cellular and Molecular Neuroscience
NTP/NEURODPT/PSYCH 611: Systems Neuroscience
NEUROL 735: Neurobiology of Disease
PSYCH 610: Statistical Analysis of Psychological Experiments I
PSYCH 733: Perceptual and Cognitive Sciences
ZOOLOGY 625: Development of the Nervous System

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PhD Track:
Systems and Synthetic Biology

Systems and synthetic biology utilizes experimental and computational tools in an iterative fashion to analyze and regulate biological systems.

Courses	PhD		MD/PhD	
	cr.	50% grad. cr	cr.	50% grad. cr
BME 701–Seminar	2	2	2	2
BME 703–Resp. Cond. of Res.	2	2	2	2
Track-specific coursework				
Engineering	9	—	9	—
Biology	3	—		
Data analysis	3	—	3	—
Math*	3	—		
Electives	3	—		
Total	28	at least 15	16	at least 10

**Math can be waived for students that have taken all equivalent courses as an undergraduate/ MS student (with a B- or better). In that case the student will take 6 credits of electives.*

Mathematics (3 credits)
MATH 443: Applied Linear Algebra
MATH 519: Ordinary Differential Equations
MATH 619: Analysis of Partial Differential Equations

Biology:
BIOCHEM 501: Introduction to Biochemistry
BIOCHEM/GENETICS/MICROBIO 612: Prokaryotic Molecular Biology
BIOCHEM/GENETICS/MD GENETICS 620: Eukaryotic Molecular Biology
MM&I/PATH-BIO 528: Immunology
ZOOLOGY 570: Cell Biology

Data Analysis:
BMI/STAT 541: Introduction to Biostatistics
BMI/COMP SCI 576: Introduction to Bioinformatics
COMP SCI 319: Data Science Programming I For Research
COMP SCI/ECE/ME 532: Matrix Methods in Machine Learning

Engineering:
BME 550: Introduction to Biological and Medical Microsystems
BME 556: Systems Biology: Mammalian Signaling Networks
BME 602: CRISPR Genome Editing and Engineering Laboratory
BME 780: Methods in Quantitative Biology
CBE/BME 560: Biochemical Engineering
CBE 660: Intermediate Problems in Chemical Engineering
CBE 781: Biological Engineering: Molecules, Cells and Systems
CBE/BME 782: Modeling Biological Systems

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PhD Program: Doctoral Minor

Breadth is a required component of doctoral training at UW–Madison. Given there are multiple paths to breadth, the Graduate School leaves the choice of whether students achieve breadth through a minor or other means up to the specific graduate program. In BME there are four options you may consider:

1. Complete an Option A minor (external)
Requires a minimum of 9 credits in a minor program (single disciplinary or multi-disciplinary). Fulfillment of this option requires the approval of the minor program. A list of minor programs can be found here. Note that this program *cannot* be BME.

2. Complete an Option B minor
Requires a minimum of 9 credits in one or more programs forming a coherent topic and can include coursework in the program. Fulfillment of this option requires the approval of the Associate Chair of Graduate Advising.

3. Complete the Quantitative Biology Minor
Students may obtain a minor in Quantitative Biology by earning a minimum of 10 credits from the courses listed here. Requirements include one course from a quantitative science, one course from a biological science, one integrated course, and a one-credit research seminar (BME 780). Courses may be taken in any sequence, although it is strongly advised that BME 780 is taken during the first year of graduate school. Questions can be directed to the minor's faculty director.

4. Document your interdisciplinary training to receive an exemption
A BME PhD student can be exempted from a minor because 1) all students are required to take a bioscience course outside of BME and the College of Engineering and 2) all BME students complete a PhD coursework track that incorporates coursework in an area of specialization. Additionally, BME students incorporate committee members from outside BME on their thesis committee and many participate in interdisciplinary collaborative research.

Documenting the PhD Minor

Prior to obtaining a PhD warrant, a student must either complete and document one of the minor options (#1-3) or provide their thesis committee with a summary of interdisciplinary coursework and training. Summaries must be approved by the thesis committee and deposited with the Graduate Student Services Coordinator for potential review by the Graduate School.

Courses included in minors must meet the following requirements:

- An average GPA of 3.00 on all minor coursework
- Coursework must be graded courses numbered 300 or above; no audits or pass/fail
- Maximum 3 credits of independent study (e.g., 699, 799, 899, 999)
- Research and thesis cannot be used to satisfy the minor (e.g., 790, 890, 990)
- Coursework may not be double counted for major requirements

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Teaching

Every BME PhD student will be expected to participate in teaching during their graduate career. BME MD/PhD students may participate with approval from the MSTP director

Required Teaching Assistantship (TA)

Starting the summer before their 2nd year, PhD students are required to apply to open TA positions that are posted for the following semester. Students will be matched to courses based on their preferences, experience, instructor approval, and departmental needs. TA positions will be in the range of 15-25% (6-10 hours/week) and the overall stipend will remain at the 50% level. If selected, students will enroll in the CoE New Educator Orientation (NEO), which covers basic policies of teaching at UW. After completing their TA position, students are not required to apply again. Students that were not selected are required to reapply until they have completed their teaching assistantship.

Additional Teaching Assistantships

Students who wish to TA for additional experience or who need to TA due to a funding gap may apply for open positions.

English Proficiency

International students whose native language is not English must take the SPEAK test during their first semester on campus, unless they have achieved a score greater than 26 on the speaking section of the iBT TOEFL (8.0 for the IELTS). Any recommended ESL coursework must be completed during the first year.



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PhD Program: Qualifying Examinations

The PhD Qualifying Examinations evaluate a student's progress towards the PhD program's educational objectives:

1. Demonstrate an ability to synthesize knowledge from a subset of the biological and physical sciences.
2. Conduct original research.
3. Demonstrate an ability to create new knowledge and communicate it to their peers.
4. Foster ethical and professional conduct.

Consistent with these objectives, the focus of these exams is on research skills rather than course content. Therefore, the examination tasks require reading literature, developing writing and presentation skills, and thinking deeply about research.

Examination Structure

The BME PhD Qualifying Examinations consist of a depth and a breadth exam that are administered by committee. To initiate the process, the student will formulate a committee of three faculty examiners at the beginning of their third semester. All examiners must be primary BME faculty or BME affiliates, and at least two examiners must be primary BME faculty. One of the three faculty is the thesis advisor; in the case of co-advised students, the committee will expand to four faculty to maintain two examiners beyond the advisors. These faculty will later serve on the thesis committee, which can be further expanded as outlined in the graduate handbook (page 30).

The student should discuss committee member selection with their advisor(s) and/or the Associate Chair of Graduate Advising.

Depth Exam

The depth exam is taken at any time before the end of a student's third semester. A minimum of one month before the exam, the student will work with their committee to identify a meeting time. The student will then reserve a room for the meeting (which will last approximately 1 hour). Finally, the student will prepare their examination documents, which are due to the committee one week prior to the exam.

Document 1: A table of courses taken/ongoing/planned, with grades provided

Document 2: A two-page (maximum), single-space thesis plan. This will be similar in format to the NSF GRFP research plan without the addition of broader impacts. The thesis plan should include approximately one page of background that outlines the significance of the problem and indicates how the planned approach is unique compared to prior research. The remainder of the document will outline the general plan for future research. Appropriate material to include are the methods that will be used (including validation and other aspects of rigor and reproducibility) and analysis procedures that are planned (including statistical tests). Preliminary data is not required.

For the exam date, the student should prepare a 20-minute presentation (with slides) based on their Document 2. The presentation to the committee is closed to the public. Following the presentation, the committee will ask questions for up to 30 minutes to evaluate the student's expertise in their research area.

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PhD Program: Qualifying Examinations

Depth Exam continued

The committee will then discuss for 10 minutes with the student out of the room. Each committee member will assign a score of 0-2 (in 0.5 increments) for the written document and a separate score of 0-2 (in 0.5 increments) for the oral examination. A score of at least 9 out of the 12 points is considered a pass (note that for co-advised students the advisors provide one score together). The student will be notified of the score immediately after the meeting.

Students will notify the Graduate Student Services Coordinator and provide the names of the committee members and the examination outcome. They must cc their advisor on this email for it to be official.

Breadth Exam

The breadth exam will occur during the semester after the student passes their depth exam. A minimum of one month before the exam, the student will work with their committee to identify a meeting time. The student will then reserve a room for the meeting (which will last approximately 1 hour). The committee will provide the student with a selected paper for discussion during this exam at least three weeks prior to the exam. The topic for the breadth exam will be selected based on 1) potential weaknesses in the student's academic preparation from the coursework plan or presentation during the depth exam (e.g., a student planning to do RNA-Seq work who struggled to describe analysis tools might be assigned a paper on these methods) and/or 2) areas that are complementary to the depth area (e.g., for a student working on MRI, a different imaging modality would be considered appropriate breadth)

The student will give a 10-15 minute oral presentation (with slides). The presentation to the committee is closed to the public. Ten to 15 minutes is not sufficient time to present every data point in every figure panel. Instead, the student should demonstrate an understanding of the paper and be prepared to answer questions about the significance, innovation, methods, analysis, rigor, and future implications of the work. A key focus should be how this article relates to the student's work. Following the presentation there will be 15-20 minutes of questions from the committee. The committee will then meet for 10 minutes with the student out of the room. Each committee member will assign a score of 0-2 (in 0.5 increments) for the examination. A score greater than 4 out of the 6 points is considered a pass (note that for co-advised students the advisers provide one score together). The student will be notified of the score immediately after the meeting.

Students will notify the Graduate Student Services Coordinator providing names of the committee members (if any changes) and the examination outcome. They must cc their advisor on this email for it to be official.

Retakes

A student is allowed one retake of either the depth or breadth exam. For the depth exam the retake must take place in the next semester. A retake in depth requires a revised document and new oral examination. For the breadth exam, the retake must occur within two months of the original breadth exam. A retake in breadth will utilize a new paper. All qualifying exams must be completed by the beginning of the fifth semester. Failure to successfully complete the qualifying exams on time will result in removal from the PhD program. Students that do not successfully complete the qualifying exams are still eligible to earn a MS degree based on their coursework.

Additional questions regarding qualifying examinations can be directed to the Associate Chair of Graduate Advising.

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PhD Program: Graduate Committee

Attaining a PhD degree requires the preparation of a thesis on a research topic selected by the student and their advisor. To help with this process, each student will assemble a thesis committee. This committee will advise and evaluate progress, administer the preliminary and final oral examinations, and evaluate and approve the thesis prior to signing the degree warrant.

In BME, the thesis committee is an expansion of the qualifying examination committee and is assembled prior to the preliminary examination with advice from the advisor and, if needed, the Associate Chair of Graduate Advising. While it is ideal to maintain constant membership from qualifying examination to final defense, members can be replaced if needed due to committee member availability (e.g. a faculty member moves) or content (e.g. additional expertise is needed to evaluate a change in research specialization).

BME Graduate Committee Requirements

- Graduate committees consist of a minimum of five members (one more than the Graduate School requirement)
  - ◊ Consistent with the qualifying examination committee, this must include:
    - -The student's advisor(s), who must be primary BME faculty or a BME affiliate
    - -A minimum of two primary BME faculty
  - ◊ In addition, the committee must include a minimum of one faculty member who is not a primary BME faculty member
- Each committee has a chair
  - ◊ If the student's advisor is a primary BME faculty, they serve as chair
  - ◊ If the student's advisor is an affiliate BME faculty, their co-advisor serves as chair (see page 6 and 9)
  - ◊ The chair must approve the membership and any membership changes

Committee Meetings

- Once formed, the committee membership and chair should be reported by the student to the BME Graduate Student Services Coordinator
- Any changes must be reported by the student to the Graduate Student Services Coordinator
- The committee will meet for the Preliminary Examination (page 31) and Final Defense (page 32)
- In addition, the committee will meet with the student for annual reports between the Preliminary Examination and the Final Defense. The student must report the outcome of these meetings to the Graduate Student Services Coordinator and cc the committee chair for this to be an official record.

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PhD Program: Preliminary Examination

The Preliminary Examination is an oral examination based upon a student's written proposal and a detailed plan to carry out their PhD thesis. Upon completion of 32 credits of graduate level coursework taken as a graduate student at UW–Madison, and passing the preliminary examination, a student is eligible to become a dissertator. Students are expected to complete their preliminary examination within one year of completing the breadth qualifying examination. Students must consult with their advisor regarding the specific requirements of the preliminary examination. Any questions should be directed to the Associate Chair of Graduate Advising.

Preparing for the Preliminary Examination

Requesting a Warrant
The preliminary exam warrant request must be completed at least three weeks before the proposed exam date. To request a warrant, students must complete a BME PhD Program Plan of Study form and the PhD Track Plan that pertains to their chosen BME PhD Track (e.g., Neuroengineering). Both documents must be approved and signed by their faculty advisor, and uploaded to their student folder on BOX. Once the documents are uploaded to BOX, please inform the Graduate Student Services Coordinator via email and the warrant will be requested for you. Warrant requests are found in a student's secure BOX file.

Writing a Thesis Proposal
Students must prepare a written thesis proposal and seek approval of this proposal from all members of the PhD Thesis Committee. Since this requires all of the PhD Thesis Committee members to read the proposal, it is strongly recommended that it be concise and required that it be given to the committee at least 1 week before the prelim exam. Prelim documents should resemble a NSF or NIH grant proposal format (maximum of 15 pages, including figures and equations, but not references or title page). The Thesis Proposal must be presented orally before all Thesis Committee members to judge whether the proposed research is satisfactory. The scope of the proposed work will be evaluated during the preliminary exam. The scope should require a period of 18 months to complete, at a minimum, prior to a final defense. Formal approval will require the signature of every member of the Thesis Committee on the Preliminary Warrant. After you successfully complete your thesis proposal, email the Graduate Student Services Coordinator and the preliminary exam warrant signatures will be requested through the Graduate School's warrant e-signature system.

Dissertator Status

Dissertator is a unique, reduced tuition fee status for students who have passed their preliminary exam and completed all requirements for a PhD degree except for the dissertation. Dissertator status begins the term after completion of the preliminary exam. As a dissertator, students enroll in exactly three research credits and work towards completing their thesis project. See the Graduate School's Academic Policy and Procedures for information on dissertator eligibility.

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PhD Program: Final Defense and Warrant

The PhD Final Defense committee consists of five faculty members. Usually, this committee is the same committee as for the preliminary exam, although changes can be made to reflect changes in committee member availability (e.g., a faculty member moves) or content (e.g., additional expertise is needed to evaluate work that branched beyond the preliminary examination proposal). This examination requires a demonstration of the unique contributions of the research and a defense of the methods used and conclusions drawn.

Final Defense Warrant Request

The PhD Final Defense Warrant Request must be filled out and sent to the Graduate School **at least** three weeks in advance of the defense. This form is available in students' secure BOX files. It should be signed by the the advisor and committee chair before being returned to the Graduate Student Services Coordinator three weeks before the final defense exam via the MyUW BOX System. Notify the Graduate Student Services Coordinator that your completed form is in your online BOX student folder, and that you would like to request your final BME PhD final warrant. If any changes are made in the membership of the committee, dissertation title, or defense date, please let the Graduate Student Services Coordinator know via email. At this time, you will also be asked to complete a PhD Final Defense Announcement form.

Students will be notified, via email, when the approval and your final warrant has been processed by the Graduate School. After you successfully complete your thesis proposal, email the Graduate Student Services Coordinator and the PhD final defense warrant signatures will be requested through the Graduate School's warrant e-signature system. Students should refer to the Graduate School's Guide to Preparing Your Doctoral Dissertation for additional information.

Final Defense and Dissertation Submission

The thesis is submitted to the PhD committee for review 1-2 weeks before the scheduled defense. The PhD defense is open to the public and an announcement will be sent out to members of the Biomedical Engineering program. Following the defense, revisions are made to the thesis as required by the committee.

After the final defense, the student must follow all Graduate School procedures. The student is responsible for submitting the dissertation to the Graduate School and reviewing the information in this handbook regarding the completion of their degree so that they can prepare for situations such as the end of RA/TA/PA positions and the presentation of diplomas to international students.

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Completing a Graduate Degree

The Graduate Student Services Office (3180 Mechanical Engineering) will send out an email at the beginning of each semester requesting the names of students who plan to graduate. This email will contain instructions and deadlines for submitting final degree warrant information for graduation. Students must also indicate plans for graduation in their MyUW Student Center at the beginning of their final semester.

Students should be knowledgeable of campus-wide Graduate School Degree and Dissertation Eligibility Deadlines and ensure that the following, program-specific requirements and paperwork are completed **at least 3 weeks before graduation**.

Requirements for Graduation

MS Requirements

To be eligible for graduation, a student must:

- Complete a MS Warrant Request form (found in student's BOX file) approved by the student's faculty advisor and the Associate Chair of Graduate Advising. Contact the Graduate Student Services Coordinator so a final warrant can be requested by the deadline (please note this form ***MUST*** be accompanied by a paragraph describing the student's area of specialization).
- Be enrolled in at least 2 credits the term they expect to earn their degree. Students will not be able to enroll in additional courses once they have submitted their warrant, unless they are continuing in the PhD program.
- Have a GPA of 3.0 or higher.
- Meet all MS degree requirements listed in this document.
- Have all grades entered (except for the current semester; no Is or NRs can be present on transcript).
- Double MS Degrees: students receiving a second master's degree from UW–Madison and students receiving two master's degrees during the same semester must submit official lists of courses used for each degree. Students can overlap up to 25% of credits from the program with the lower degree credit requirement.
- Complete the online exit survey.

PhD Requirements

To be eligible for graduation, a student must:

- Meet all PhD degree requirements listed in this document.
- Complete a PhD Final Warrant Request form (found in student's BOX file), upload to BOX, and notify the Graduate Student Services Coordinator of its completion at least three weeks prior to the Final Defense for processing with the Graduate School.
- Complete the online exit survey and schedule an in-person interview with the BME Department Administrator.

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Completing a Graduate Degree

Things to Remember When Finishing a Degree

End of Student Status and Financial Support
All graduate students will retain student status through the end of the semester, until the official date of graduation and at that time are no longer eligible for financial support. If the student holds an assistantship or a fellowship, the student must consult with his or her advisor and the Payroll and Benefits Specialist to determine the end date of the appointment and its ramifications.

Diplomas
Diplomas will be mailed 12-14 weeks after the degree deadline to the mailing address listed in the Student Center. All international students are required to enter a diploma address into their Student Center to receive a diploma. Consult the Office of the Registrar's page on diplomas for more information.

Feedback
An online survey will be emailed to all graduate students completing their degree. This survey is extremely helpful to the department in tracking where students go after graduation. We greatly appreciate cooperation in completing this survey. In-person interviews are also possible for MS degrees and required for PhD degrees.

Email and Continued Department Communications
Student email can be accessed after graduation. Consult the university's KnowledgeBase (KB) for more information on alumni access to email services.

Students should remember to keep in touch via Facebook, Twitter, and LinkedIn, and feel free to contact the BME department or Student Services Office with any questions or concerns after graduation.

Commencement

Once a student has met their degree requirements, they may choose to attend a fall or spring commencement ceremony. Students should reference the Graduate School's and the university's information regarding commencement for more details regarding preparing for the ceremony proper attire, dates and times.

Traditionally, PhD students are hooded by their faculty advisor. PhD students should discuss their commencement plans with their advisor.

College of Engineering Graduate Recognition Event
The College of Engineering holds a Graduate Recognition event every spring semester after the Saturday commencement ceremony. Students who are graduating with a BS, MS or PhD engineering degrees are welcome to take part in the College of Engineering event. Learn more on the College of Engineering graduation webpage.



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Academic Standards

Students should note the below university, college, and departmental policies regarding graduate student academic performance:

Satisfactory Progress

The Graduate School requires that students maintain a minimum graduate GPA of 3.00 in all graduate-level work (300 or above, excluding research, audit, credit/no credit, and pass/fail courses) taken as a graduate student unless probationary admission conditions require higher grades. The Graduate School also considers Incomplete (I) grades to be unsatisfactory if they are not removed during the next fall or spring semester in which a student is enrolled; however, the instructor may impose an earlier deadline. A student may be placed on probation or suspended from the Graduate School for low grades or for failing to resolve incompletes in a timely fashion. In special cases, the Graduate School permits students who do not meet these minimum standards to continue on probation upon recommendation and support of their advisor.

The BME program requires satisfactory progress to continue funding support. Satisfactory progress includes meeting the departmental and advisor expectations (page 13), as well as completing the Qualifying Examinations, Preliminary Examinations, required Teaching Assistantship, and annual committee reviews on time.

Probation

If a student was admitted on probation and they satisfy the conditions outlined at the time of admission, probationary status will be removed automatically. Once their studies have begun, students are expected to make satisfactory progress toward their degree. Students must be in good academic standing with the Graduate School, their program, and their advisor.

The Graduate School regularly reviews the record of any student who received grades of BC, C, D, F, or I in graduate-level courses (300 or above), or grades of U in research and thesis. This review could result in academic probation with a hold on future enrollment, and the student may be suspended from graduate studies. The Graduate School may also put students on probation for incompletes not cleared within one term. Dissertators will not be placed on probation for incomplete grades in research courses. All incomplete grades must be resolved before a degree is granted.

Please note that any student who is on probation will not be able to enroll for the following semester until their final grades are submitted and the Graduate School has verified they are making satisfactory progress.

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Grievance Procedures

If a student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance.

Procedures for Proper Accounting of Student Grievances

Step 1
The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved at this level. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties, or reach out to the Graduate Student Services Coordinator or Associate Chair of Graduate Advising for additional assistance. These activities do not rise to the level of a formal grievance; however, the student is encouraged to keep documentation of these interactions as they may be useful if a formal grievance is pursued.

Step 2
Should a satisfactory resolution not be achieved, a formal grievance can be filed with the BME Grievance Committee. To do so, the student contacts the Department Administrator, who will provide the student with the name of the current chair of the Grievance Committee. The student will then contact the Chair of the Grievance Committee, who will reply within seven calendar days. If the grievance is with the current Chair of the Grievance Committee, please let the Department Administrator know and they will identify an alternate committee member to contact. It is advised that grievances are filed within 60 calendar days of the alleged unfair treatment to enable a thorough investigation.

Step 3
If the student does not feel comfortable working through the departmental process, they are encouraged to seek out other campus resources including:

- The Assistant Dean for Graduate Studies in the College of Engineering
- The Graduate School
- McBurney Disability Resource Center
- Employee Assistance Office
- Ombuds Office
- University Health Services (UHS)

Step 4
At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has ten working days to file a written appeal to the School/College. For more information, students should consult the College of Engineering Academic Advising Policies and Procedures.

Step 5
Documentation of the grievance will be stored for at least seven years. Significant grievances that set a precedent will be stored indefinitely. The Graduate School has procedures for students wishing to appeal a grievance decision made at the school/college level. These policies are described in the Graduate School's Academic Policies and Procedures.

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Hostile and Intimidating Behavior

Hostile and intimidating behavior, sometimes known by the shorthand term "bullying," is defined in university policy as "unwelcome behavior pervasive or severe enough that a reasonable person would find it hostile and/or intimidating and that does not further the University's academic or operational interests."

Hostile and intimidating behavior (HIB) can occur in the university setting. Even individual instances of such behavior can have a significant effect on the person it's aimed at, and can take a physical and emotional toll, reducing the effectiveness of a person's work or learning. It is a significant reason for unhealthy workplace climate and culture and should be addressed immediately. Hostile and intimidating behavior is prohibited by university policy.

What is Hostile and Intimidating Behavior?

Hostile and intimidating behavior is defined as unwelcome behavior pervasive or severe to the extent that it makes the conditions for work inhospitable and impairs another person's ability to carry out his/her responsibilities to the university, and that does not further the University's academic or operational interests. A person or a group can perpetrate this behavior. The person need not be more senior than or a supervisor to the target. Unacceptable behavior may include, but is not limited to:

1. Abusive expression (including spoken, written, recorded, visual, digital, or nonverbal, etc.) directed at another person in the workplace, such as derogatory remarks or epithets that are outside the range of commonly accepted expressions of disagreement, disapproval, or critique in an academic culture and professional setting that respects free expression;
2. Unwarranted physical contact or intimidating gestures; Conspicuous exclusion or isolation having the effect of harming another person's reputation in the workplace and hindering another person's work;
3. Sabotage of another person's work or impeding another person's capacity for academic expression, be it oral, written, or other;
4. Abuse of authority, such as using threats or retaliation in the exercise of authority, supervision, or guidance, or impeding another person from exercising shared governance rights, etc.

Repeated acts or a pattern of hostile and/or intimidating behaviors are of particular concern. A single act typically will not be sufficient to warrant discipline or dismissal, but an especially severe or egregious act may warrant either.

continued on next page

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Hostile and Intimidating Behavior

What to Do if You Feel You've Been the Target of Hostile and Intimidating Behavior

Undesired consequences of hostile and intimidating behavior can be avoided or minimized when the problem is addressed early on, but victims are often hesitant to pursue a formal process before the impact is severe. Educational opportunities and campus resources have been implemented with the intent of aiding all employees and students in defusing situations before they become severe. These resources, including trained personnel who can advise and mediate, comprise the "informal process." It is possible that situations will continue to arise in which informal interventions are not effective, and the "formal process" has been designed to address those situations.

You are encouraged to seek out advice and consultation after the first instance of hostile and intimidating behavior: consultation is not escalation. Discussing what's happened in a timely way can often prevent continued bullying. Here are some ways to do this:

1. Seek advice from a trusted colleague;
2. You may choose to seek informal resolution by approaching the individual yourself or with an intermediary;
3. Consult your advisor, human resources representative, department chair, director, dean, or any campus resource to discuss options for resolution;
4. Keep notes of what happened, when, where, and who was present. Retain copies of any correspondence.

Graduate students sometimes experience hostile and intimidating behavior from faculty members. If you are a student who is experiencing such behavior, you are entitled to support as a university employee through the Ombuds office, the Dean of Students office, and the Graduate School. Graduate students can also consult with Graduate Coordinators and/or the Graduate School.

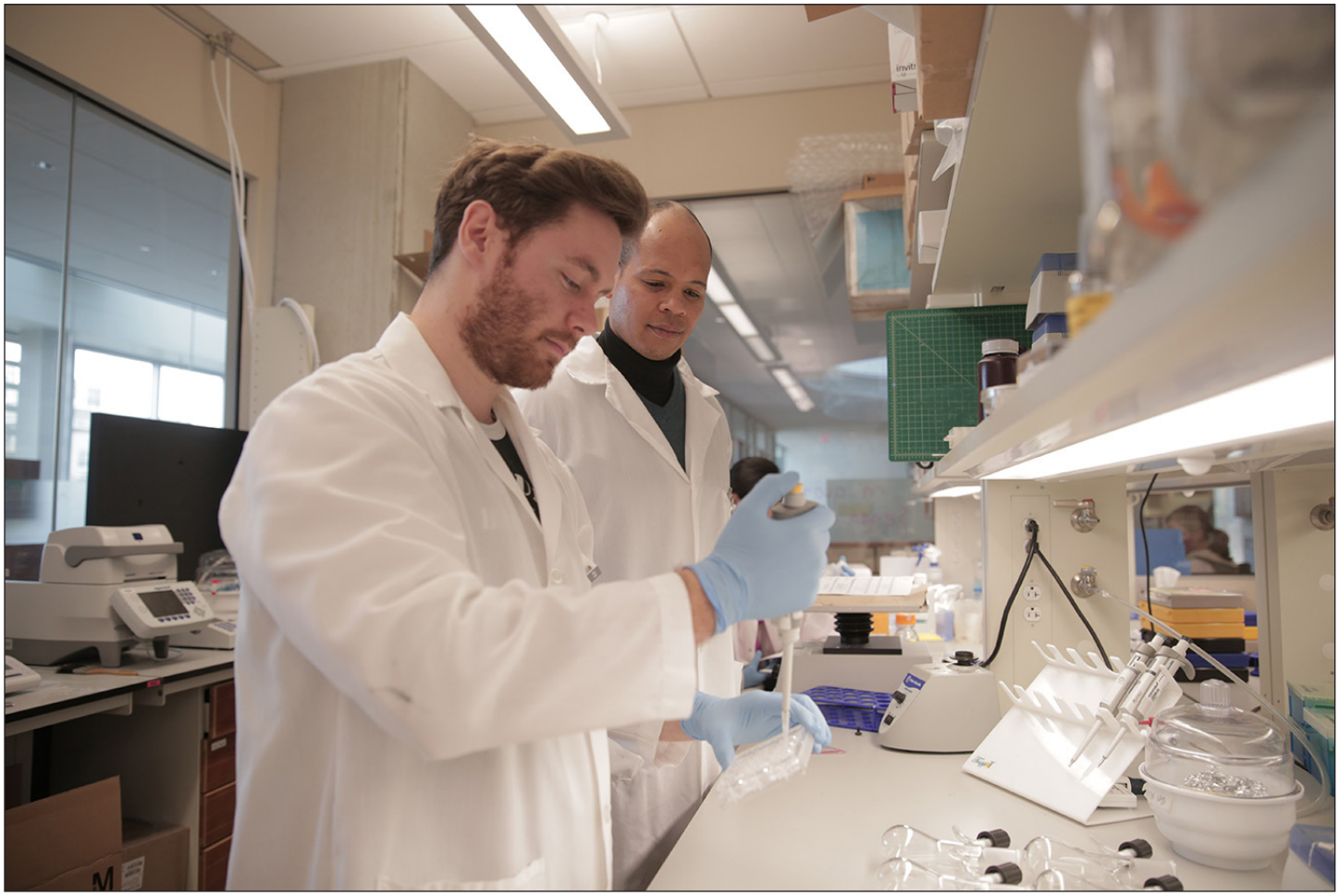
BME graduate students with concerns may contact the College of Engineering Assistant Dean for Graduate Affairs, the BME Associate Chair of Graduate Advising, or the BME Grievance Committee. Additional campus information on hostile and intimidating behavior is available here.

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Funding

Students admitted to the Biomedical Engineering PhD program may receive financial support in the form of research assistantships, teaching assistantships and fellowships. Support is dependent on availability of funds and students maintaining satisfactory progress towards their degree.

Both research and teaching assistantships include full tuition remission. Please note, students who receive tuition remission are still required to pay segregated fees by the tuition due date. The amount charged for segregated fees is based upon the number of credits the student has enrolled in and will therefore decrease once a student achieves dissertator status.



Benefits

Health Insurance

All UW–Madison students are eligible to receive health care at the University Health Service (UHS) as part of their tuition fees (excluding hospitalization and emergency room services). TAs, RAs, PAs, and fellows holding a minimum 33.33% appointment are eligible for enrollment in group health insurance through the university **within the first 30 days of employment**. The university will pay for most of the premium. To learn more about benefits and in order to activate insurance, students should see the department's new employee resource page and see the Payroll and Benefits Specialist.

Leave Insurance

RA appointment leave is covered by the Graduate School's Academic Policies and Procedures - students are encouraged to discuss with their advisors how to document their leave. In addition, the following policies apply:

- University legal holidays are to be kept free of mandatory requirements.
- Consistent with UW policy, student religious observances are to be free of mandatory requirements.
- If necessary, a student may discuss the option for an extended leave of absence with their advisor and the Associate Chair of Graduate Advising.

Parental Leave

The College of Engineering (COE) is fully committed to providing a climate of support for those who choose to have children during their graduate studies. The goal of this COE parental leave policy is to reduce academic and financial hardships for a) pregnant graduate students during the late stages of their pregnancy, childbirth, and postpartum periods, and b) any graduate student who is a new parent providing care for a child.

All COE graduate students with current research, teaching, or project assistantships are eligible to request a parental leave under this policy. Upon request, pregnant students will be provided with 12 weeks of paid accommodation time for childbirth. Other new parents (biological or adoptive) will, upon request, be provided with 6 weeks of paid accommodation time. There will be no research or teaching expectations of the student during the leave. Students should ideally notify their department (through the Department Administrator or Department Chair) six months prior to the expected birth or adoption to request the leave. Pregnant students should alert their research advisor or TA coordinator at that time as well to ensure that the ongoing research and teaching environment is safe. It is recognized that each case will be unique in terms of the timing of the pregnancy or adoption relative to the academic calendar, and that creative and supportive solutions will be required on the part of advisors, chairs, TA coordinators, etc.

The leave will ordinarily begin at the time of birth or adoption, but other proposals will be considered. Departments – both advisors and chairs – are expected to provide flexibility in working out the details of the leave and to adjust the timeline of the leave as needed to accommodate any unexpected medical issues that arise during pregnancy (e.g. doctor-ordered bed rest). All academic requirement deadlines (e.g., qualifying exams) will be extended for the student requesting the leave, consistent with department academic policies for extended leaves.

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Quick Links: Student Resources

The links below are easy-to-access resources available to students through BME, the College of Engineering, and the university.

Calendars

UW–Madison Academic Calendar
Start and end dates, holidays, and exam dates for academic terms across campus.

Enrollment Deadlines and Tuition Payment
Information from the Office of the Registrar regarding when students can adjust their scheduled courses. For tuition due dates and payments, see the Bursar's Office.

Degree and Dissertator Eligibility Deadlines
List of dates students requesting final warrants and preparing for graduation should be aware of as they form their academic plans.

Commencement
The university's official site for all information concerning upcoming graduation ceremonies.

Campus and Academic Life

UW–Madison Guide to Campus Life
The university's complete compilation of student resources and opportunities; including student organizations, events, health and wellbeing, and life in Madison.

Graduate Policies and Procedures
The Graduate School's expectations for student conduct, academic achievement, and degree-earning efforts.

International Student Services
A resource for international students searching for programs in the Madison community and assistance related to visas and immigration.

Computers

CAE (Computer Aided Engineering)
The technology resource for computers and software specific to the College of Engineering campus.

DoIT (Division of Information Technology)
The university's main provider of technological assistance, products, and education.

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Quick Links: Student Resources

College and Department Resources

BME Staff Directory
The staff directory page for the department.

College of Engineering Intranet
An internal website with resources for students and employees, including links to college policy, department resources, travel reimbursements, employee benefits, meeting space reservations, and more.

Creating Community at UW–Madison

Inclusive Excellence
The university's office for the promotion, integration, and transfer of inclusive excellence to campus.

Health and Wellness

University Health Services
The university's provider of student physical and mental health services and education.

McBurney Disability Resource Center
A resource for students who have a documented disability — or suspect that they may have an undiagnosed disability — to obtain academic accommodations.

Learning Resources and Assistance

Engineering Career Services
A college office offering assistance to students searching or preparing for internships, co-ops, and jobs.

Steenbock Library
The university's main library for engineering students. The engineering librarian team is located in room 118.

Makerspace
A student-run, rapid prototyping facility with a wide range of rapid prototyping equipment.

Technical Education and Manufacturing (TEAM) Lab
Provides UW engineering faculty, staff, and students with the majority of the tools and equipment found in a modern machine shop as well as a full wood lab, welding lab and sheet metal lab.

The Writing Center
Campus-wide organization that provides free of charge, face-to-face and online consultations for students writing papers, reports, resumes, and applications.