

Expectations and Useful Information

for EBFM Lab/Byron research group

Group description

The Environmental and Biological Fluid Mechanics lab studies the transport and motion of intermediate-scale particles and organisms in complex flows. We work at the intersection of biology, solid mechanics, and fluid dynamics to solve complex problems in animal locomotion, particle settling, and turbulence. For more information on our research, visit <https://sites.psu.edu/byronlab/>.

Though our research interests are what bring us together, the EBFM lab also strives toward larger goals. We want to improve the world around us using tools from engineering and science. We view research problems through a “big-picture” lens, and see engineering as a way to improve human flourishing in many ways. As such, we adhere to the following values and expectations.

Group values

Academic research is one of the best jobs in the world, but it is a privilege, not a right. Members of the EBFM lab (both students and advisor) are therefore expected to uphold the following values:

TRANSPARENCY: We are forthright and honest about our research progress, including both success and failure.

- *For the advisor:* I will answer questions honestly and to the best of my ability. I will be forthcoming with information about research projects, including funding status. I will never lie to you.
- *For the student:* you will be honest with me about the progress of your project and any obstacles you are facing. Struggle is a valuable part of learning, but so is asking for help. If you have personal issues that interfere with your research, please let me know (share as many details as you feel comfortable with). If you’ve broken a piece of equipment, discovered a bad bug in your code, or other serious issue, tell me right away and do not delay. As long as your actions were not intentional or negligent, I won’t be mad.

INTEGRITY: We perform our work in keeping with the highest ethical standards.

- *For the advisor:* I will not pressure you to exaggerate the impact of your work or falsify data. Research misconduct is serious, and I will discipline students who engage in it (up to and including expulsion from the lab). Harassment of any kind is not tolerated. I will work hard to develop a safety culture in the lab and will never ask you to do anything that makes you feel unsafe. I respect all of my students as people.
- *For the student:* Ethical offenses (e.g. falsifying data, plagiarism, or other misconduct) are not tolerated. If you see this behavior from one of your fellow students, you must tell me immediately. This protects the reputation of the lab and its members, and ensures that the scientific process works as intended.

DEDICATION: We are passionate about the art of research and discovery, and work hard to push the boundaries of human knowledge.

- *For the advisor:* I typically put in about 55 – 70 hours of work per week. While I don’t want to encourage a culture of workaholism (see below), I do want to emphasize that I am dedicated to our research and to the health of the lab. My first priority is always your safety and development as independent thinkers and scientists in your own right. I work hard and expect you to do the same.
- *For the student:* Graduate school is not easy. It does take long hours and occasional sleepless nights, and is not a normal 9 to 5 job (though see “balance” below). During your thesis or dissertation, you will become THE contact person/expert for your project; you should be able to answer questions from me, your fellow students, and other scientists on campus and beyond.

BALANCE: We recognize lab members as whole people, not science-producing machines; whole people have physical, mental, and intellectual needs. We take care of ourselves and each other.

- *For the advisor AND the student:* Because our work is intellectual, you may never be able to completely “turn off” from your project. However, I expect you to take time away from the lab. Everyone has different ways to recharge—going for a hike, cooking, and playing music are some of the ways that I “unplug” from the lab. I also find that brief stints with no internet access (including email or social media) are very helpful. Seek mental health resources on campus (I have a list), and stay physically active. I care more about you as a person than as a researcher, but even so—taking care of yourself physically and mentally will make you a better researcher anyway! Extra hours do NOT necessarily translate into more productivity; there is a point of decreasing return. Get to know your own rhythms and figure out what works for you.
- **THE MOST IMPORTANT THING TO REMEMBER ABOUT ACADEMIC RESEARCH:** You are not your work. **Your value as a human being is independent of your successes and failures in research.** Failure is a crucial part of the research process, and has absolutely no bearing on your personal worth. I will strive to remind you of this on a regular basis.

Advisor expectations (& info)

Congratulations, you have just signed up to work with an assistant professor! As a PI (Principal Investigator), I have many responsibilities. Though my first priority is and always will be the lab and its members, there are quite a few other demands on my time (teaching, service to the department/ university/scientific community, securing funding, reviewing papers and grants, and more... see below). There are distinct pros and cons associated with working for a new PI. Pros: your success is my success; I am invested in your research and will push you to present and publish your work. Cons: I’m still figuring out how to manage our group successfully. Here are some guidelines to start us out:

- **Communication.** Most of our communication should be in person or via the lab Slack. Keep lab-related matters off email if at all possible. If you must email, know that I try to check email only twice per day (around 9:30am and around 5pm)—if you need an immediate response, use Slack. I have the app on my phone and will usually respond promptly. I keep an “open-door” policy—if my door is open, I am in my office and available to chat at least briefly. Stop by if you are in Reber and need some quick assistance.
- **Schedule.** I’m typically on campus from 8am to 6:00pm; this fluctuates substantially during summers and breaks. Early mornings are my writing time—my door is usually closed until 9:30am. I sometimes work from home so if you need to schedule a meeting with me outside your regular spot, aim for at least 24 hours’ notice. My calendar is available at <https://sites.psu.edu/byronlab/cal/>; it includes all my personal and professional commitments. If you request a meeting, please check the calendar first and propose 2-3 times that work for you so we can eliminate as much back-and-forth as possible.
- **Weekends.** I work from home most Saturdays but can usually come into the lab if needed. *I typically do not check email or work from Saturday evening to Sunday evening.* Please do your best not to contact me during this time unless it is an emergency.
- **Travel.** I typically attend 3 to 4 professional conferences per year, for which I travel domestically and internationally. This time will be marked on my calendar, but sometimes videoconferences can be arranged while I am away. All travel time will be marked out on my calendar in advance.
- **Meeting schedule.** I have regular weekly meetings with my graduate students. When appropriate, undergraduates will receive most of their direct supervision from the graduate student whose project is closest to their own. I will occasionally meet on a regular one-on-one basis with undergraduate students. We will also have bimonthly group meetings, when the whole lab comes together and each member shares his/her progress. See next section for meeting format/content. I will come to these meetings prepared, and I expect you to as well.

- **Logistical hurdles.** Your primary obstacles should be scientific ones. Please let me know promptly about non-scientific obstacles (e.g. the office or lab is too cold in winter; your software license has expired; your computer is running too slowly; we are out of lab supply X). This also applies to scientific problems that you have given a good-faith effort to solve on your own. A good mantra is “if it seems trivial, it probably is.” Bring trivial-seeming problems to your weekly meeting or schedule an ad-hoc meeting with me if it is seriously hampering your progress.
- **Funding.** One of my biggest responsibilities as the lab’s PI is to secure funding (i.e., grants) for the lab to cover student salaries, health insurance and other benefits, lab supplies, equipment, conference travel for myself and students, publication costs, and more. This takes up a substantial portion of my time and I may need your assistance periodically (see next section).
- **Professional development.** Scientific research involves many transferrable skills (public presentation; technical writing; disciplined record-keeping; and much more), which will serve you well no matter where you go professionally after your time in the lab. I support the development of each student’s professional goals and will regularly check in to make sure that your work in the lab is serving those goals.

Expectations for all students

These expectations apply to all students (undergraduate and graduate) that participate in research in EBFM lab. See the following two sections for additional details.

- **Lab safety and upkeep.** In addition to the required safety trainings, I expect each student to be proactive about lab safety. Use appropriate PPE (gloves, laser safety goggles, etc); stop work immediately if you have safety concerns. Late nights in lab may be unavoidable, but work with a buddy if possible (certainly if you will be using lasers). Each student is responsible for keeping the lab clean and organized; a clean lab is safer and produces better work. All students are expected to participate in periodic “lab cleaning days”.
- **Data management and record-keeping.** In an increasingly connected and technical world, data management is of utmost importance. Anyone who reads our work must be able to follow our process cleanly and easily from the moment of raw data collection all the way to the figures in a published paper. We will use many tools to ensure that this is always the case.
 - **Lab notebooks.** Every student must keep a lab notebook detailing everything that is important (or may eventually become important) to understand the experiment. You will quickly learn that this includes almost every piece of information that crosses your mind. My slogan is: “when in doubt, write it out.” Lab notebooks are very personal; although I may need to look at yours occasionally, develop a style that works for you. *Every bit of information that would be necessary to exactly repeat your experiment setup, execution, data analysis, and results should be included in your lab notebook.*
 - **Data backup.** Much of our data will be collected as raw images or videos, sometimes at high spatial or temporal resolution. It is not unusual for one project to produce terabytes. *You are responsible for backing up your data at the end of each day.* I will assist by providing external hard drives and/or cloud storage—whatever is practical for your project.
 - **Data “pipeline”.** In our work, there are often many steps to transform raw data into the variables of interest (e.g. raw image data → image preprocessing → velocity fields → velocity postprocessing → turbulence statistics). Each step in this “pipeline” must be documented, repeatable, and easy to follow. Pay close attention to file-naming conventions and above all, be consistent.
- **Collaborative work.** All students are expected to work as a team. Each student will have “ownership” over their specific project, but I expect you to bounce ideas off of one another, seek feedback, and troubleshoot experiments/analyses together. I like this quote (from Richard Feynman): “Science is a way of trying not to fool yourself. The principle is that you must not fool yourself, and you are the easiest person to fool.” Fooling yourself becomes much harder if you have regular contact with your labmates!

Graduate student expectations

Graduate students are the heart and soul of any functioning research lab. It is YOUR work, YOUR dedication, and YOUR brainpower that pushes those frontiers of human knowledge. I am excited to advise you on your journey of intellectual and personal growth. That being said, I have high expectations for each of you. Here are some:

- **Availability/work hours.** While I do not expect all students to keep the same hours, some overlap is important to facilitate mutual assistance and team-building. Arrive at the lab/office no later than 10am and leave no earlier than 4pm. Plan to work *at minimum* 40 hours per week (inclusive of both classwork and research work). Occasional working from home is OK but extended periods should be okayed by me in advance. Please keep yourself available by Slack in case of questions from me or your labmates.
 - **Work rhythm.** Take some time to figure out your personal rhythm so that you can maximize your use of time. For example, I have trouble sustaining focus from about 2 – 4pm, so I avoid writing papers or grants during this time. Your rhythm may be different; make an effort to find it.
- **Classwork/grades.** I expect excellent performance on classwork from all of my graduate students, and will help you select classes to maximize benefits to you. Time spent on classwork should decrease gradually until (for PhD students) you are not taking any classes but instead focusing full-time on research.
- **Reading.** Keeping up with the scientific literature is a vital part of research. I will help guide your reading, but you are ultimately responsible for exploring the (vast) body of existing knowledge related to your project. Expect to read about 3 – 5 papers per week, and sometimes more. While I may suggest papers occasionally, you should be searching for papers to read on your own. Let me know if you need help.
- **Writing.** I require all of my graduate students to take a technical writing class (ME 600 “Academic Writing” is strongly suggested). PhD students should expect to produce at least 3 – 4 peer-reviewed journal articles during their time in the lab; for MS students, expect to write 1 – 2. Some projects may produce conference papers, but peer-reviewed journals are the primary way that we communicate our results. The first author of a paper is responsible for the first draft; additional authors may provide text, figures, or editing help as appropriate. I will serve as the senior (last) author on most papers that come out of the lab.
- **Funding.** All eligible students will be expected to apply for appropriate national fellowships (NSF GRF, NDSEG, DOE SCGF, etc). These awards are prestigious and often have extra benefits/higher pay. The application process for these fellowships also gives you good practice in technical writing. I will support your applications with edits/comments, recommendation letters, and advice. I may also request assistance with my own grantwriting (i.e. a plot of your results; a paragraph of text; etc).
- **Meetings.** Expect to have a weekly one-on-one meeting with me to discuss your progress and struggles as well as a bimonthly group meeting to get feedback from the group. We will also schedule semesterly “big picture” meetings, focusing on professional development and overall goals.
 - **One-on-one meetings.** The day before your meeting, please update your designated Box document/folder with the following three items: 1) what you have been working on over the past week; 2) areas where you are currently struggling; and 3) plans for moving forward. We will go over these items together and decide on appropriate goals for the following week.
 - **Group meetings.** Each graduate student lab member (and some senior undergrads) should prepare 1 to 2 Powerpoint slides detailing your recent work. Group meeting is a chance for you to share your struggles with the people best-equipped to help you through them: your labmates.
- **Travel.** As you take ownership of your project, I will begin sending you to present your work at national and/or international scientific meetings. Though the conferences you attend will be highly student- and project-specific, I will usually send senior students to 1 – 2 conferences per year. PhD students, whenever possible, will have the opportunity to attend at least one small Gordon-style conference (50 – 100 people). If your project has a field component, you may be asked to travel to field sites as well.

Expectations for undergraduate students

Undergraduate research is an exciting way to apply classroom principles to real problems. Peer-reviewed studies (and PSU's own internal student placement data) show that students involved in research are more successful in finding jobs (or graduate school admission) after college. Penn State has many opportunities to get involved with research and I'm glad you've chosen EBFM lab! Here are some expectations for your time as a lab member:

- **Compensation.** Graduate students earn a salary and tuition waiver for their work in the lab. Undergraduate students are compensated in two ways: 1) financial compensation or 2) course credits. Financial compensation is more common in summer and usually comes from a funded REU program (see e.g. <https://www.engr.psu.edu/ceeri/>), scholarship (e.g. the Shuman Scholars program), or (rarely) grant funding. More commonly, undergraduates enroll in 1-3 credits of ME 496, which count as a technical elective. You must have at least a 3.0 GPA to enroll in ME 496. If neither (1) or (2) is an option (no funding is available; you cannot commit the minimum lab time for research credit; etc), you may work on a volunteer basis. However, this should be a temporary solution while we pursue the two channels above.
- **Time in the lab.** Students taking ME496 should be working at least 3 – 4 hours per week per course credit (so 3 credits of ME496 correspond to 9 – 12 hours of work per week). This is comparable to the amount of time expected for a typical 400-level engineering course. Students who are being paid for lab work will discuss appropriate weekly work requirements before beginning work in the lab. In some cases an hourly wage may be appropriate (commensurate with experience); in others, a scholarship may provide a lump sum for a summer or semester period. These will be discussed on an individual basis.
- **Contact with advisor/supervisor.** While I enjoy working with undergrads, my time is finite. I typically meet with undergrads once or twice a month (rarely weekly). I will help you outline and set up your project, but you will likely be working with a graduate student as your primary supervisor. If you must miss a planned experiment or cannot make your weekly work commitment (due to family commitments, exams, etc), notify your graduate supervisor and work out a plan to minimize disruption to your project.
- **Meetings.** Expect to meet weekly or every other week with a graduate student in the lab (or in some cases, with me). If you are available, plan to attend our bimonthly research group meetings. While undergraduate researchers are not expected to present a progress report at every group meeting (as graduate students are), you may be asked to present your work periodically. Group meetings are also a good place to solicit feedback from the larger lab group.
- **Work space.** Undergraduate researchers may have access (keys) to the lab depending on their project, and are expected to take care of lab resources just as graduate students are. In general, undergraduates will not have their own office space. I encourage you to use the E-knowledge commons and MNE computer labs, or the underutilized Engineering Library in the Hammond building.
- **Reading.** Immersion in the scientific literature is a crucial part of learning how to do research. I will provide you with some reading, but your graduate supervisor will also help you with this. Use Penn State's collection of resources to investigate your project topic and help you "fill in the gaps".
- **Writing.** Each undergraduate student will produce, at the very least, a semesterly "Summary Report" of their project and the results it has produced. In some cases, an undergraduate project may be part of a peer-reviewed manuscript. To be an author on a manuscript, the student must be actively involved in the writing process (not just conducting some experiments).
- **Travel.** In rare cases, I may elect to send an undergraduate student to present their results at a national scientific meeting. More commonly, I will send students to local conferences or symposia that focus on undergraduate research. If you are traveling on behalf of your work with the lab, you are expected to behave as a representative of the lab at all times. You may also be asked to travel to local field sites (e.g. Ten Acre Pond) if your project involves animal work.

Onboarding checklist (all students)

- ❑ **Join the Byron IT group.** Send an email containing your PSU email ID (abc123) to support@me.psu.edu and ask to be added to the user group for all MABY machines. Please cc mzb5025@psu.edu on this email.
- ❑ **Lab/office keys.** Go with me to 132 Reber Building to see Jamie Shade. Bring your PSU ID card. You will be given keys to the lab (Reber 107 and/or Hammond 014) and (for grad students) graduate office (336D Reber).
- ❑ **Lab safety training.** Go to <https://ehs.psu.edu/> and click “Training” under the Quick Links bar on the left. Log in if necessary with your PSU ID. Click “Laboratory Safety and Laboratory Hazard Communication”, then “University Park Laboratory Safety (Initial)” and follow instructions to complete the online modules. Schedule the in-person portion of the training as soon as possible. When you have your official certificate, please scan it and back up a digital PDF copy. Place the original into the lab safety binder in 107 Reber in the appropriate section.
- ❑ **Laser safety training.** On the same page as above, under “Radiation Safety” → “Laser Fundamentals and Safety,” please complete all modules. While you may not work with lasers, you are likely to be around people who do and may be called to assist with their projects.
- ❑ **Join ebfmlab.slack.com.** We use this platform for day-to-day communication to keep everything self-contained (and lower email volume received by all). Follow instructions sent in the email you receive after your onboarding meeting.
- ❑ **Join EBFM Asana page.** We use this platform to keep track of tasks, deadlines, and collaborative projects. Expect to add goals on a regular basis during research meetings. Follow instructions sent in the email you receive after your onboarding meeting.
- ❑ **Individual Development Plan.** Visit <http://myidp.sciencecareers.org/> and begin to create an individual development plan. Take time to reflect on your career/professional goals. We will discuss these on a semesterly basis; the IDP is a living document that you will update as your goals mature and change.
- ❑ **Other departmental or university-level onboarding activities.** These may include:
 - Orientation
 - Hiring paperwork
 - Visa issues/background check if necessary
 - All forms (some or all of: I-9, W-9, I-94, W-4)
 - Onboarding in WorkDay
 - & any additional steps—see emails sent by department or PSU officials