

Expectations and Useful Information

for EBFM Lab/Byron research group (updated August 2022, changes in red)

Group description

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

Though our research interests are what bring us together, the EBFM lab also seeks 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. As such, we adhere to the following values and expectations.

Group 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 group member:* you will be honest with me about the progress of your project and any obstacles. Struggle is a valuable part of learning, but so is asking for help. If you have personal issues that interfere with your work, please let me know (share as many details as you feel comfortable with). Serious issues (broken equipment, results-altering bugs in code, etc) should be disclosed immediately.

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. I will discipline students who engage in misconduct (up to and including expulsion from the lab). I will work hard to develop a safety culture in the lab. I respect all of my students as people.
- *For the group member:* Ethical offenses (e.g. falsifying data, plagiarism, or other misconduct) are not tolerated. Harassment of any kind is not tolerated. Report violations to Dr. Byron immediately.

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 am dedicated to our research and to the health of the lab, and often put in long hours writing grants, thinking about new projects, and cutting red tape so that you can push your projects forward. 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 group member:* Academic life can be challenging and may demand more time than you anticipated. Graduate school is not easy, and it is not a normal 9 to 5 job; graduate students may be asked to put in more than 40 hours per week at times (though see “balance” below). Every member of the lab may be asked to pull hard before a deadline or during specific situations (e.g. fieldwork). Note that 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 group member:* 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. Taking care of yourself physically and mentally will also make you a better researcher!

Extra hours do NOT necessarily translate into productivity; there is a point of decreasing return. Learn your own rhythms and figure out what works for you.

INCLUSION: We work to create a welcoming atmosphere for researchers from many different backgrounds, and value the perspective that is gained by listening to different viewpoints.

- *For the advisor AND the group member:* Science is made of humans, and engineering is made FOR humans. A fuller understanding of what it means to be human can only help us in our goal to make the world a better place. To better understand the scientific process, we must also understand how research is informed (and often skewed) by deep-seated historical and cultural biases. We will also work towards supporting and listening to researchers (inside our group and out) who have been marginalized, disadvantaged, or otherwise tossed aside because of their immutable personal identities.

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 no bearing on your personal worth. I will strive to remind you of this on a regular basis.

Advisor expectations (& info)

As a PI (Principal Investigator), I have many responsibilities. My first priority is the lab and its members, but there are numerous demands on my time (teaching, service to the department/university/scientific community, securing funding, reviewing papers and grants, and more). Here are some (always-evolving) guidelines on what you can expect from me:

- **Communication.** Most of our communication should be in person or via the lab comms platform (currently MS Teams). *Keep lab-related matters off email if at all possible.* I try to check email only twice per day (around 9:30am and around 5pm)—if you need an immediate response, use Teams and I 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 9am to 5pm, but this fluctuates. I sometimes work from home so if you need to schedule additional meetings with me, aim for at least 24 hours’ notice. My calendar is at <https://sites.psu.edu/byronlab/cal/>; it includes all my personal and professional commitments. 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. I am **not** often online in the evenings, **but** feel free to message me with any questions or thoughts **and I will get back to you as soon as I can.** You do not need to respond to any messages sent outside normal working hours (but please respond promptly when you are back in the office/lab). Prompt responses are especially important around deadlines (e.g. for papers, conference abstracts, etc).
- **Weekends.** *I typically do not check email or work from Friday evening to Sunday evening.* If you must contact me during this time, use Teams. I keep weekends for family time and will be slow to respond.
- **Travel.** I typically travel to attend 3-4 professional conferences per year. I also travel to give lectures at other institutions. 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. Undergraduates will receive most of their direct supervision from the graduate student whose project is closest to their own. We will also have weekly group meetings; 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; your software license has expired; your computer is slow; we are out of X). This also applies to scientific problems that you have made 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 group members

These expectations apply to **everyone** that participate in research in EBFM lab.

- **Lab safety and upkeep.** In addition to 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 high-risk equipment like lasers or power tools). Keep the lab clean and organized; a clean lab is safer and produces better work. All **members** will participate in periodic "lab cleaning days".
- **Data management and record-keeping.** 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 **group members** are expected to work as a team. Each **person** 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. 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 the 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 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.** All graduate students should take a technical writing class (ME 597 “Academic Writing” with Dr. Berdanier is strongly suggested). PhD students should produce at least 3 – 4 peer-reviewed journal articles during their time in the lab; MS students, 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.** Each semester should have a running “weekly memo” document. The day before your meeting (by 8pm), update your weekly memo with: 0) Your current reading list, 1) what you have been working on over the past week; 2) 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.** Group meetings take several formats: “journal club”, “workshop”, and “research roundtable”. For a research roundtable meeting, each **postdoc or** graduate student (and some senior undergrads) should prepare 1 to 2 Powerpoint slides detailing your recent work. This is a chance for you to share your struggles with the people best-equipped to help you through them: your labmates. For a journal club meeting, the student leading the meeting should prepare a presentation of a peer-reviewed journal paper closely related to their project (**following the format of the ME qualifying exam**). Other students are expected to read the paper before the meeting and come prepared to discuss its findings, methodology, strengths, and weaknesses.
- **Travel.** As you take ownership of your project, I will begin sending you to present your work at national and/or international scientific meetings. 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 visit 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 usually comes from a funded REU program (see <https://www.engr.psu.edu/ceri/>), scholarship (e.g. the Shuman Scholars program), or (rarely) grant funding. More commonly, undergraduates enroll in 1-3 credits of ME 496 (ME494H for Schreyer scholars), 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 or ME494H should be working at least 3 – 4 hours per week per course credit (so 3 credits 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 working for course credit are expected to submit weekly hours and achievements, just as students working for wages log their hours; your course grade will be based on your record of working hours and what you have done with them. 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/mentor.** I typically meet with undergrads once or twice a month on an ad hoc basis (rarely weekly). I will help you outline and set up your project, but you will be working with a graduate student as your primary mentor. 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. If you are available, plan to attend weekly research group meetings. While undergraduate researchers are not expected to present progress reports, 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 ME 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 mentor 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.** You will produce, at the very least, a semesterly summary of your project and results. In some cases, your project may be part of a peer-reviewed manuscript. To be an author on a manuscript, you must be actively involved in the writing process (not just conducting experiments).
- **Travel.** In rare cases, I may send an undergraduate student to present their results at a national scientific meeting. More commonly, I will send you to local conferences or symposia that focus on undergraduate research. When traveling, 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.
- Lab/office keys.** Go with me to 132 Reber Building to see Jamie Shade. Bring your PSU ID card. You will receive keys to the lab (Hammond 014 and 042).
- Lab safety training.** Log in to the Learning Resource Network at <https://lrn.psu.edu/>. Search for "University Park Laboratory Safety" and find the Curriculum "EHS – Initial Laboratory and Research Safety". 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 014 Hammond in the appropriate section.

- ❑ **Laser safety training.** On the same page as above, find “General Laser Safety” and 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.
- ❑ **Ladder safety training.** Find the “EHS – Ladder Safety” training and complete it as above.
- ❑ **Join EBFM Lab on MS Teams.** We use this platform for day-to-day communication to keep everything self-contained (and lower email volume). You will receive an email with instructions.
- ❑ **Other departmental or university-level onboarding activities.** These may include:
 - Orientation
 - Hiring paperwork
 - Visa issues/background check
 - Forms (e.g. I-9, W-9, I-94, W-4)
 - Onboarding in WorkDay
 - & any additional steps—see emails sent by department or PSU officials

Lab Roles

The following roles are assigned on a rotating basis, with the following duties:

- **Safety czar.** Ensure that all group members have completed required trainings and filed completion certificates in the appropriate binder. Complete laboratory self-inspection each year. Liaise with college and department level safety officers. CURRENT: David Peterman
- **IT Guru.** Hold administrative privileges for laboratory machines, and install software for group members when needed. Liaise with Chris and Nick (support@me.psu.edu) for any issues with connectivity etc. CURRENT: Hai Cong Le
- **Office Manager.** Oversee the fridge, printer, and other communal facilities in the grad office (42 Hammond). Let Dr. Byron know of any needs. CURRENT: Reza Zharfa
- **Lab Supply Minister.** Supervise lab cleaning days and keep track of consumables. Let Dr. Byron know of any needs in a timely fashion so that replacements can be ordered. CURRENT: Adrian Herrera
- **Cruise Director.** Organize fun get-togethers (hikes, happy hours, mini golf tournaments, etc) for the lab at least once per semester. CURRENT: Snigdha Tikader