

Welcome Letter and Orientation Notes

Welcome to the Sensing in Biomechanical Processes Lab (SimPL)! We are a lab in the Biomedical Engineering area of the Mechanical Engineering Department at UBC, and we are also affiliated with the School of Biomedical Engineering.

The purpose of this document is to communicate important information that I feel will contribute to your success here and beyond. The document provides you with guidance as to what will be expected of you—and what you can expect—during your time here. My main objective in mentoring is to provide you with top-notch scientific training while you contribute to the goals of SimPL and advance your career. Your training will be broadly based within the realm of Biomedical Engineering and Biomechanical Engineering. As you read through this please keep in mind that it was prepared to be directed to students with a wide variety of backgrounds and training. Although I believe that everything in this document may be applicable to you, some things may apply more or less to different individuals.

MENTORING PHILOSOPHY AND LAB CULTURE

While I am officially your research mentor and director of the lab, I would like to think of us as working together on the same research projects. I hope to have open communication with you, and work together closely through study design, experiments, data analyses, and publication. I will pass on as much knowledge and experience as possible. At the same time, graduate students do directly perform most of the research activities, with first-hand experience in your own projects. As such, I expect you to be proactive in managing your research projects.

In addition to learning how to conduct research, an important goal for you should be to develop excellent communication skills that will promote your advancement in biomedical research. This involves becoming a contributor able to present your work in an effective manner, and a listener who can offer constructive criticism. Thus, participation in presentations, seminars, and abstract/manuscript preparation, as well as journal/manuscript reviews will constitute an important part of your training.

Our lab conducts biomedical engineering research at the intersection of multiple disciplines (biology, mechanical engineering, electrical engineering, statistics, etc.). It is my belief that multidisciplinary work and collaborations in biomedical engineering are very powerful in 1) producing research outcomes that directly lead to clinically translatable technologies, and 2) inspiring new and innovative work. As such, I would like to have a team environment in my lab and encourage collaboration within and outside of the lab. While students will each have their own thesis questions, I strongly encourage you to work closely with others as part of a larger project.

It is also my belief that graduate school is an opportunity for one to become a more well-rounded individual, not just in research. Thus, I also hope to provide general guidance as well as foster a healthy and positive learning environment in the lab to help with that. In addition, I strive to encourage a fun and friendly lab atmosphere.

WORKING HABITS AND STYLE

In addition to providing training, the lab is responsible for maintaining a competitive research program whose progress is monitored regularly and funded according to its productivity. Everyone's efforts are of paramount importance to our success. At SimPL, I work hard to get funding and resources that could support stipend/tuition as well as study activities, to minimize the cases when students need to worry about funding or resources. Please keep in mind that your graduate studies are supported by lab funds from research grants, and your responsibility is to work towards the research goals of these grants. You should place high priority on optimizing your use of time and of lab resources to enhance your ability to generate results. The extent to which you achieve this will likely be *the most* important determinant of your success. I also encourage all students to apply for graduate fellowships (e.g. NSERC, CIHR, Mitacs), which are tremendously valuable resources. Obtaining fellowships will not only help build your CV, but also help you financially (top-ups are offered in addition to the standard stipend amounts when you secure a fellowship).

I prefer that everyone's working schedules, including my own, to overlap as much as possible, to increase the opportunities to communicate. To achieve this, it may be easiest for everyone to be in lab at least during business hours, outside of class time. Aside from this consideration, I will not measure a student's success by the number of hours they spend in lab, as long as good research progress is made and research milestones are met in a timely fashion. As a graduate student, you are also expected to develop good time management skills and learn to balance your coursework and research. Courses should not be taken just as a formality to obtain credits, but should ideally contribute to your graduate training (e.g. to help gain useful skills for your specific career goals, and knowledge that could help with your research). At the same time, do recognize that your success as a graduate student will mainly be measured based on research output, not on your academic performance in courses.

I would also like you to be aware that the nature of some of our research may require a relatively flexible schedule. For example, during human subject experiments that could be driven by sports season, subject availability, equipment/facility availability etc., our schedules may also be driven by such time constraints, and may involve work on the evenings/weekends. During such times, I will understand if you want to take some time off elsewhere.

Do keep in mind that your work ethic is one of the most important questions potential employers will ask me as your supervisor, and evidences that you use your time well, work efficiently, work productively, and put in good effort will help me a lot in giving concrete examples of work ethic in such scenarios.

Not everyone has the same working style, nor am I expecting all members of the lab to adopt the same working habits. However, a better understanding of each other's working styles and preferences would help make the team more effective. Here I would like to point out some of the most important working habits of my own, to give you a sense of what it may be like to work with me. First, I plan ahead and try not to do things last-minute. As such, if you need my help with something (e.g. reviewing a manuscript or conference abstract), it is best to let me know as early as possible, preferably at least two weeks in advance of deadlines, so I can plan it into my

schedule. It also allows me to foresee what I need from you or others ahead of time, so that I do not make last-minute requests. In general, please do not assume I'll be able to accommodate short turn-around times. Second, I prefer to have a concrete plan laid out prior to experiments, especially ones that involve multiple people/equipment/resources and can easily go wrong if they are not carefully planned out. As a result, for such experiments (e.g. laboratory or field human subject experiments), I would likely ask for detailed study plans at least a few weeks prior to the experiment time, and sometimes perform pilots to test things out ahead of time. Third, I have high standards for data presentation, writing clarity, and depth of information presented in manuscripts. This applies to my own work, as well as any work coming out of our lab. As such, please expect that I will work together with you to create very high-quality work, and multiple rounds of revisions may be needed to make that happen. If you have any other thoughts regarding working style, I'm happy to discuss in person and work out a good way to work together.

Social Activities: Social gatherings are encouraged in the lab. I hope to have regular lab socials (e.g. welcome parties, holiday celebrations, happy hours, hikes), at least once a term. Unofficial lab outings are also encouraged. Healthy social interactions help with team bonding, and allow everyone to get a chance to relax in a very busy work environment. I am always open to suggestions on fun social activities, so please feel free to let me know if you have a proposal, and I also encourage students to organize events for themselves.

Vacation: The official UBC Graduate Student vacation policy can be found here:

<https://www.grad.ubc.ca/faculty-staff/policies-procedures/graduate-student-vacation-policy>

I am okay with having some flexibility with the vacation policy, as long as satisfactory research progress is made and planned milestones are accomplished in a timely fashion. In general, if you are away for part of a day (e.g. for doctor's appointments, coursework, personal meetings, etc.), you don't have to notify me unless there are conflicts with lab-related responsibilities/meetings/events. If you are to be away for a day or more, or are planning short vacations (less than a week), please let me know at least two weeks in advance, and also indicate the vacation on your work calendar. To help with work planning, please notify me at least 1 month in advance of any vacations that are one week or longer (ideally as soon as you know dates for the planned trip). When there are time-sensitive research activities (e.g. human subject experiments that are limited in a certain timeframe), we will discuss time requirements as early as possible, so any vacations may be planned around such activities.

COMMUNICATION

Good communication is key for a team to work well together, by making sure we're always on the same page, you are getting the help that you need, and we as a lab are achieving our research goals.

General Notes: Communication of experimental results in the form of abstracts and talks, and via manuscript preparation, is the most important/effective way to improve your opportunities for career advancement. Through your ability to acquire, develop and communicate experimental results, you can present your capabilities as a scientist to the scientific community. Therefore, it

is invaluable to make a good impression through hard work, group participation and good communication skills. In addition, employers will look for someone who not only has a strong research record (e.g. through good publications), but one who is a good team player in their department or company. Effective working relationships with your peers will not only help with your research during your graduate studies, but also help you form networks and develop effective communication skills for your future career.

Notebooks: As good research practice and for the purpose of anticipating audits on our research, you should keep record of all the research activities. This may come in the form of a traditional paper notebook, with records of all experimental procedures, materials/equipment, raw data records, dates/times, and notes. I recognize the fact that in recent years, it may be more practical to keep electronic records using electronic notebooks or electronic files. For our lab, each graduate student is given a lab notebook, that will stay with the lab after the student leaves, as a record of their work. You are required to at least use this notebook for record-keeping during important experiments that may generate publishable data. Other notes, including literature review notes, preliminary data analyses, raw data files, draft manuscripts, should be kept on both your work computer and the lab server. Good note-keeping will make things a lot easier when you have to present your research, since you can likely just copy paste your methods/results from the notebook.

Attending Conferences: Conferences are important, not only to hear recent developments before their publication, but also to allow others to get to know you and your work. I expect and want to support every student to attend at least one conference per year. I am happy to use lab funds to support travel, on the condition that you submit an abstract for a talk or poster presentation at the conference. Getting the opportunity for an oral/podium presentation would especially help increase the visibility of your work, and is often only granted to the top abstracts submitted to the conference. Conference abstracts are typically due 6 months prior to the conference date. As such, advanced planning is required if you would like to attend a conference. Typically, depending on the format and length of the abstract, you need to have enough results for at least 1 or 2 figures by the time of abstract submission, and should continue to gather additional data/perform analyses such that you have sufficient materials to present on the poster or in a 10-15min talk. Please note that a lot of conferences also have student presentation competitions, and I highly encourage you to look for these opportunities and participate. Winning a presentation award is one of the best ways to showcase yourself to future employers and also typically comes with some funding.

Data Presentation: Learning to increase the rate at which your data can be interpreted, so as to produce useful information, is one of the most challenging objectives for all scientists. Frequent discussion of your raw data with me is probably the best way to keep your project moving on the right track. We will discuss and plan how to proceed efficiently, develop testable hypotheses and explore interesting findings. Whenever you have new data or new analyses that you would like to discuss, you can let me know and I'm happy to discuss any time.

Presentations: Your presentations at lab meetings and conferences should be well prepared. You should take these very seriously. Rehearse your presentations for lab meetings and external talks. If you don't know already, please learn how to use graphic aid design software (e.g. Adobe

Illustrator, or its free alternative Inkscape) to effectively increase the friendliness and information content of your presentation. It is also very useful to become good at PowerPoint, for your graduate education as well as future career. Models, statements of hypotheses and graphic depictions of experiments go a long way to improve the communicability of presentations. These types of slides often stimulate the most useful discussion.

Networking: We know from experience that although a good publication record is important, it alone may not be enough to launch or establish your career. To help with building your network, I will make colleagues aware of your work and when possible, introduce you to them, and promote your exposure to the community. I do this by mentioning you in communications with other scientists, when I talk at meetings and seminars, introducing you at conferences, and by recommending you for talks at meetings.

Email/Calendar/Phone/Other Communications: Outside of face-to-face meeting times, the most common form of communication is email. I will try to keep my email turnaround time to be within 48 hours, which may be longer if I am traveling or in meetings. In return, I would also hope to have timely and efficient email correspondence with my students. For effective scheduling, we will make use of a work calendar (e.g. UBC email calendar, or gmail calendar). Phone communication will be minimized, unless we decide as a group to use a phone application for project management during highly time-sensitive activities. For urgent matters, you are encouraged to find me in person (in my office) or text/call me.

Respect for Peers: I expect everyone to be treated with respect in the lab. No form of insult, abuse (physical/verbal), or discrimination are tolerated. If you feel that you are mistreated at any point, please talk to me. If you witness any interactions that you are uncomfortable with, please also let me know. Everyone is expected to take the UBC trainings on harassment / violence / bullying prevention and understand what is considered inappropriate behaviour.

CONDUCT OF RESEARCH

You should do research with the highest degree of scientific integrity. Honesty and responsible conduct are expected of you and your coworkers, and you should know what to do if something goes wrong. There are a lot of resources online that I can share. At the same time, much of this is also common sense – design ethical experiments, do not forge data, etc. Some of the research conduct issues could also be more subtle. For example, as humans, we tend to see things we want to see (such as seeing a positive result in data that's not well supported). Or, one may perform experiments in a way that reduces the amount of work/effort but sacrifices data quality. Another very common problem is for research to be driven by non-scientific gains (e.g. financial). I would like to ensure high quality of research in the lab, and make sure that studies are reproducible, conclusions are well-supported by evidence, and our efforts are driven by scientific questions. As the leader of the lab, it is also my responsibility to do this quality check with all activities and outputs of the lab. If you feel that something is violating the scientific integrity of the lab, come talk to me first.

AUTHORSHIP & COLLABORATIONS

It is not uncommon for disputes on authorship to occur in academia, even for senior researchers. We want to avoid this by discussing it openly ahead of time. In case of a dispute, I will be the major determinant of the order of authors for papers led by our lab. As an example, some conflicts arise when a student comes into a project that is already ongoing and for which other or previous students have already done considerable work. Often the later arriving students have little appreciation or knowledge of the contribution of the departing or departed student and naively believes that the project is his or hers and should be in full control. As another example, students collaborating on the same project may each feel like they have made more significant contributions to deserve better authorship. It is important that we discuss any anticipated order for authorship not only at the beginning of a collaboration but also as it continues as it can change depending on the development of the project and the work done or to be done. What is most important is not to assume anything about the situation and to discuss it with me.

As alluded to above, another recurring issue is "ownership." Researchers often think that the project they are working on is "theirs" and interpret that to mean that they have extensive rights with respect to the project including the right to decide with whom they can collaborate and even the right to decide the future scientific direction of a project, even to the point of believing they can override the PI's preferences. Please be aware that this is not the case, and the PI of the lab has the final say in research decisions. Also, criteria used for determining first authorship are not altered because of special circumstances (e.g. someone is trying to graduate or looking for a job). One is no more entitled to first authorship when they are on the job market than the circumstances normally dictate based on their work relative to others.

Although collaborations among lab members are encouraged and common, these should be entered into and agreed upon explicitly by the individuals involved as well as me. Usually, coauthorship requires you to have put in substantial work in study design, generating experimental data, helping with data analysis/interpretation, and manuscript drafting/revisions; simply providing advice/suggestions or a readily available resource is not enough. I may ask you to teach someone a technique, but this does not mean you should necessarily expect to be a coauthor. These important issues should be discussed to avoid potential misunderstandings. Likewise, you may benefit from the help of a colleague who teaches something you need to learn for a project.

Before you enter into collaboration with an external member (e.g. classmate, other professor, company), speak with me first and certainly refer the potential collaborator to me. Although it is not required that you speak with me before you make a request of materials from others, I prefer that you send me a draft of the request before you send it to the outside researcher. Requests by others for our lab's resources must be discussed with me before they are distributed.

EVALUATION

I evaluate all students regularly. Continuation of your funding by the lab is expected but not guaranteed, you must be an active positive contributor to our work. Extensions are approved on a yearly basis. Students are expected to function with increasing independence over time, and to

assume additional responsibility for our work. You should be aware that I am often asked to evaluate people before and after they leave our group, specifically by potential employers and fund granting agencies. It is not uncommon to be asked to rank a candidate in several categories.

A typical "Reference Report Form" includes:

- Knowledge in the chosen field
- Motivation and perseverance toward goals
- Ability to work independently
- Ability to work as a member of a research team
- Ability to plan and conduct research
- Ability in oral expression
- Ability in written expression
- Imagination and probable creativity
- Communication skills.

They also ask for ranking, i.e., top 2%, top 5%, top 10%, top 25% of students, etc. It is helpful to keep these items, and your responsibilities, in mind during your training, and always to conduct yourself as professionally as possible.

INTELLECTUAL PROPERTY, PATENTS, AND COMMERCIALIZATION

Sometimes, the technology work in our lab may lead to novel designs that are ‘patentable’ or ‘commercializable’. I realize that some students have interests in pursuing industry and/or entrepreneurship, and will provide support for those who would like to patent their ‘patentable’ work, and even take it further to start a company. Please discuss with me if you have such interests and think that something you’re working on is promising in this respect. Please also keep in mind, that as a research lab, our first priority is research and science. Personally, I prefer open science, open data sharing, and technology transfer. It is against university policy to pursue research that leads to ‘proprietary’ technologies. Instead, openly sharing information through publications helps to better advance science. When there is question of conflict of interest, I would also be very careful in evaluating the scientific integrity of our work.