As a member of my research group, I expect to work with you to set achievable goals. We will periodically evaluate your progress with respect to these goals.

**Expectations**

You should explicitly discuss and then write down expectations with respect to mentorship and training. This should include topics such as ­­­meeting frequency, progress reporting, in-person laboratory attendance, and policies related to personal travel. It is important that your advisor is aware of your needs, and also that your expectations are aligned with the mentoring style and professional obligations of your advisor. If your advisor is planning to be on sabbatical and meeting with you monthly by phone, but you are expecting to meet in-person weekly and by phone three times a week, expectations are not aligned. You would be unlikely to succeed and your relationship with your advisor will be stressed. Clear communication and written expectations maintain good professional relationships.

**Your plan**

Meet with your advisor to discuss your goals. Produce written answers to the following questions before your meeting:

1. What are your goals for the summer and next academic year?

**Summer goal: Implement a functioning classifier for the level 2 GEDI data that can identify bogus waveforms in the noise. The model does not have to be optimal or complex, but it should be able to perform well on the training set and run without logic bugs.**

Statement: I will follow the plan listed below. Throughout each stage of the project, I expect to seek support from graduate students and the CS department to enhance my conceptual understanding and improve my coding.

* I will self-study machine learning through the acclaimed *Machine Learning Specialization* course on Coursera. This should take around 80 hours in total. I will spend around 20 hours on it per week, and I expect to finish it and receive the certification by **July 8th**.
* I will review the papers and materials from GEDI and related research, this will be done by **July 12th**.
* I will explore the data to understand its structure and contents. This includes visualizing the data using plots and graphs to gain insights. I can also begin feature engineering if it seems necessary. I will produce a short summary of key findings by **July 19th**.
* I aim to have the data ready for training by **July 22nd**, after which I will begin implementing the ML algorithm.
* I will also figure out how to use OSCAR **as soon as my first model is implemented.**
* I will implement at least two different classifiers using Python. This includes training, hyperparameter tuning, and testing. I will ensure my code is free from logic bugs and runs correctly by **July 31st.**
* In the last week, I will iteratively tweak the models to improve their accuracy, precision, recall, etc. I will select the highest-performing model and tune the hyperparameters. I may also use additional statistical techniques to compute the optimal parameters.
* If there is time left, I will write and submit a short report about this summer’s progress by **July 24th**.

1. What goals do you have by the time you graduate?

**Graduation goal: I want to have a published (or at least publishable) honors thesis and solid mathematical skills that prepare me well for a Master’s program in statistics/data science/machine learning.**

Statement: I do not know how publication or research works. I will spend 30 minutes each day networking with alumni in research or research-adjacent fields and asking about their experiences. I will take two real analysis classes and APMA 1740. I will prepare for my Master’s application through a plan similar to the previous one.

1. What is your five or ten year goal?

**Five-year goal: I want to work full-time in a data science role in quantitative finance, or aerospace, or sustainability, preferably near an urban center.**

Statement: I am well aware of the required skills for these positions, so I will continue to build them, starting with this research project and throughout my Master’s degree. My networking efforts this summer (and in the foreseeable future) will be primarily tailored to these fields. I have entered BrownConnect’s alumni networking program. And will spend an additional 30 minutes each day reading preparatory material (e.g. Green Book for quant recruiting) or networking with more alumni.

In consultation with your advisor, write a statement or short paragraph that lists the things that you need to do to achieve each of these goals. Here is one example of goals for the current academic year followed by three examples for three different five-year goals:

One year goal: Submit a grant proposal on February 1.

Statement: I need to review the requirements for grant proposal submission by October 1, including submission requirements and timelines. Then I will research previously funded grants to the same program by October 7. I will speak to the program manager during the week of October 14. I will produce a completed draft of the grant proposal to be shared with my academic advisor by Thanksgiving break. I’ll tell my advisor that I expect to receive written feedback by December 15. This will allow me to revise the grant proposal between January 1 and January 15. I’ll communicate this entire plan to my advisor today and will make sure my advisor understands that I will be sending a document for feedback before Thanksgiving, and that it is crucial that I receive feedback by December 15 to remain on time.

This example explicitly recognizes the importance of building in margin, planning and communication. Margin is contingency. It recognizes that things do not always work as we expect them to. People get sick, OSCAR goes down, animals die, experiments take longer than expected, instruments fail, and pandemics happen. Develop a plan that accommodates uncertainty. Clear communication lets your advisor know what you need and when you need it.

Five year goal: I want to work in industry in a highly-paid technical position, probably for a startup.

Statement: I need to determine the set of skills that are most relevant to industry employment with a high rate of pay in my area and ensure that I acquire those skills. I will cold call one person a week working in a job that I want and ask them how they got the job and what skills they believe are most relevant.

Ten year goal (for a current PhD student): I want a tenure track position at a major research university in North America.

Statement: I need to publish 5 to 10 papers in high-quality peer-reviewed journals in the next 10 years. I therefore need to publish 1 to 2 papers a year starting now. I need some teaching experience. Grant writing experience would be helpful.

Ten year goal: I want a tenure-track job at a teaching-intensive institution.

Statement: I need to obtain significant teaching experience during my dissertation. I need to publish 5 to 10 papers in high-quality peer-reviewed journals in the next 10 years. I therefore need to publish 1 to 2 papers a year starting now.

The goals you develop in collaboration with your advisor may be shared with members faculty as needed. The faculty will discuss steps necessary to help you achieve your goals and provide you with written feedback. This could include courses that you should take, meetings you should attend, and relationships you should build. Faculty recommendations will focus on your professional development broadly in addition to your academic training.

**The importance of written goals**

Writing goals and developing a clearly defined plan is an important component of success. People who write down their goals are more likely to achieve them than people who do not, and goal setting is a skill that can be taught. Goals should be actionable and measurable. Actionable goals are objectives that allow you to take specific action, whereas poor goals do not. For example, contrast these two statements:

*I want to climb to the top of Mt. Everest.*

*I’m going to determine which vaccines are necessary for me to travel to Nepal by January 1*.

In each case, the ultimate goal is the same (climbing to the summit of Everest) but the former is not actionable and the latter is. The former is not actionable because it is not immediately clear what to do *right now*. The former goal is only a statement of desire. It says what the writer *wants* to do, not what the writer *will* do. Actionable goals must be measurable and not open to multiple interpretations – it must be clear to everyone whether they have been achieved or not.

A good goal:

*I am going to submit the first chapter of my thesis for publication to a peer-reviewed journal by September 1, 2022.*

The above goal is good because it is measurable (the manuscript will be submitted or not) and because it is not open to more than one interpretation (submission has a clearly defined meaning and a deadline).

A bad goal:

*I am going to make progress on the first chapter of my thesis and hope to submit it this fall.*

This goal is bad because it uses the vaguely defined term *progress*, which means different things to different people. It also does not have a real deadline, because it says *hope to submit* and does not include a date. Now imagine that the student who wrote the bad goal had written a few pages of the manuscript by September 1, satisfying the *progress* requirement in the mind of the student. Has the goal been met or not? Reasonable people will disagree about this, which is why this is a bad goal.

**Machine learning for outlier detection in GEDI data**

You are joining the lab to work on the problem of machine learning related to GEDI data. Our initial objective is to develop a machine learning classifier to identify low-quality waveforms. One published paper and one draft manuscript will be shared with you that describe the general problem. We have not explored this problem in enough detail to have a clearly defined work plan, so our initial steps should focus on getting to the point where a work plan can be developed. Your advisor and other members of the lab are able to provide you with guidance, but this research is an unsolved problem will require significant self-directed learning.

**Professionalism**

You are expected to maintain a high degree of professionalism at all times. You must not share data or code or ideas of others outside the lab. Some data you will have access to may be protected by confidentiality or non-disclosure agreements. You are expected to honor these agreements. You are expected to participate in regular lab meetings and to contribute to the general sense of scholarly community in the lab.

**Meeting plans:**

I expect to regularly receive mentorship and training related to the scientific research process and domain-specific knowledge, as well as any other tangential questions that may arise. I recognize that data analysis is the primary focus. I am committed to self-studying and would also appreciate some support regarding common statistical techniques and modeling strategies.

I will meet with my advisor in the following format.

1. One long meeting at a specified time each week (30 minutes). Preparation: I will produce an agenda that may include slides, and will provide material to my advisor at least 24 hours before the meeting. The slides from each week will be archived to track progress.
2. Two short meetings at two specified times each week (15 minutes). Preparation: I will produce short agendas that include bullet points, notes and graphic examples of my progress, and will provide material to my advisor at least 24 hours before the meeting. The slides from each week will be archived to track progress.

**Communication:**

Critical communication will occur through Email and Slack (preferable). It is your responsibility to pin down your advisor if you need a response to an issue urgently. It is your responsibility to manage your professional obligations so that important issues do not become urgent as a routine matter. Your advisor has clarified that he categorically will not commit to reviewing documents or providing letters of recommendation when a first draft of the materials is provided less than **one week** before the deadline.

JB Zhu

James R. Kellner