JRaviLab docs

For members of the JRaviLab: past, present, and future!

Janani Ravi & members of JRaviLab

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About JRaviLab docs

This is a short e-book compiled to guide, onboard, and offboard JRaviLab members at the University of Colorado Anschutz Medical Campus (and Michigan State University).

Acknowledgments

We appreciate and build upon awesome onboarding resources from Arjun Krishnan, Casey Greene, Fan Zhang, Annika Barber, Christoph Rau, Jeff Leek, elife, and several others.

If you'd like to edit/update/contribute to this e-book (*built with Quarto*), please email me or submit a pull request to the GitHub repository directly.

How to reach us

Webpage | PI | Twitter | Mastodon | Email

1 Onboarding

Welcome to JRaviLab! We are excited that you are here — as a student, postdoc, or visiting researcher! We have a number of resources available in this short e-book and on Slack. Please take the time to check these out. As you read them, if something is unclear, please feel free to reach out to the group anytime.

Once you are done with the 'familiarizing' and getting to know the first steps, please send me (JR) a message on Slack. Please bring your questions, thoughts, and feedback to the meeting.

Good luck & welcome aboard!

2 Mission, Expectations, Conduct, Support

- Mission, expectations, code of conduct
- Health, wellness, safety
- Diversity, accessibility

We believe in investing in and nurturing scientists as much as the science. We pride ourselves on providing a safe and inclusive space for people across intersectionalities. We are committed to mentoring (postdocs, students, programmers), education and outreach, and personalized professional development. We are passionate about increasing diversity and retention in STEM and quantitative sciences. If you share our passion, please reach out to us!

2.0.0.1 Work hours

See the Hours section here.

For any student-employee-related questions, please refer to the University of Colorado Denver student hourly employment handbook or the student employment website.

Both handbooks define the student employment rules for the Denver and Anschutz Medical Campus.

2.0.0.2 Time Off

Always be a happy researcher! To be a happy researcher means you need a good balance between work and time off. We encourage you to take time off when needed, but there are a few things to remember.

- Mark your time off on the lab calendar and notify your PI and coworkers in advance.
- Let others know if you miss any meetings during your time off. Please do your best to plan your work accordingly when known vacation times are approaching. Don't leave too much undone before going on vacation because you may have too much to do when you return, which can cause stress.
- Also, leave good notes on what you were working on and what you must do when you return. Sometimes, when you are gone for too long, remembering where you left off can be hard, so having these notes can help you get back on track.

- Studies have shown not having a sustainable work-life balance can lead to difficulties in maintaining an efficient, productive, and healthy research experience. Therefore, it is essential to maintain a healthy work-life balance to ensure the best and most productive research experience.(Bartlett et al., 2021)
- Be respectful of your labmates and avoid sending them messages when they are on vacation. If you are working closely with them on a project or need their help, notify them of any deadlines that may overlap with their vacation. This way meetings can be determined before your labmate leaves for vacation.
- If you receive work-related messages during vacation, you are not obligated to answer them unless they are critical. If the message is urgent (esp. something you've committed to prior to your vacation), please do your best to answer them as soon as possible.

For more information on time off regulations, refer to the Leave policy section here.

3 Role-Specific Expectations

Details on expectations per-role can be found here in the Roles and expectations section, but if you have any questions, feel free to talk to any of us!

4 Lab Proceedings

- Working remotely | CU Remote Work Agreement
- Communication within the group | Slack | In-person/Zoom co-work
- Research update presentations | Meetings
- Giving & receiving constructive feedback

5 Slack

Since our lab runs on Slack, let's first get you on there. All our conversations & every last bit of science get done here! :) So, please install this on your desktops (phones) and turn on notifications during working hours, whenever that is!

5.1 Getting started

When you join, please introduce yourself in `#general`. Tell us a little about yourself here — where you are from, what your interests are, science-wise or otherwise, why you are interested in working with us, and in what capacity you'll be joining us.

I've never used Slack -- where do I even start? Maybe you can start with the Slack cheatsheet and Keyboard shortcuts.

5.2 What next?

Next, you can join the different channels to participate in various kinds of conversations with the group — look at the channel description, check out the pinned messages of the channel, and dive right in! Here are a few examples.

Finally, you will be invited to specific project channels (based on the primary and secondary projects you will be working on). Based on chats with your colleagues, if you'd like to contribute to/give feedback to other projects, feel free to join those channels too.

5.3 Meet the group

You may have briefly spoken to a few group members prior to joining. I urge you to take the first few weeks to introduce yourself to the group members and chat with them (via Slack or over coffee/tea) to find out what they are up to and learn a bit about the lab.

6 GitHub

If you haven't already, please create a professional GitHub account (e.g., `jananiravi`) with your full name. Once you pass that along to us, we will add you to the JRaviLab GitHub organization. Also, a neat memorable username will give you the opportunity to host your own webpage (e.g., `jravilab.github.io` or `jananiravi.github.io`). Our group repo is here.

7 Social media

If you have officially joined us as a grad or postdoc, or undergrad for 3/6+ months, you will automatically get added to our group webpage. If not, please check a few sample pages and furnish me with those details – I can add you there right away. Also, we use Twitter for professional networking & announcements (connecting with the broader scientific/R/technical communities). If you have a Twitter handle, share it with me (DM), or follow #auto-twitter for updates. You can check out/follow a few accounts maintained by us: JRaviLab | my handle | RLadies-Aurora | RLadies-EastLansing | Women+ Data Science | AsiaR | ISMB EvolComp-Gen COSI. Thanks to recent *interesting* changes at Twitter, people have been migrating to Mastodon (e.g., genomic.social, fosstodon, JRaviLab) and Bluesky | my handle!

If you would like to co-maintain any of these accounts or our webpage, please DM me. I'm always looking for volunteers! :)

8 Lab culture

8.1 Mission

We value and believe in investing in and nurturing scientists as much as the science. We pride ourselves on providing a safe and inclusive space for people across intersectionalities. We are committed to mentoring (postdocs, students, programmers), education and outreach, and personalized professional development. We are passionate about finding new, better ways to increase diversity and retention in STEM and quantitative sciences. If you share our passion, please reach out to us!

8.2 Roles and expectations

8.2.1 PI

My role as a PI would be to ensure your growth and success as a trainee, and the success of the project. Towards this, I will

- serve as a sounding board for all your ideas. You will have the freedom to work on your best ideas broadly aligned with the lab's vision and you will always find in me an audience to discuss and brainstorm.
- help outline and plan your project(s) and design appropriate analyses.
- check-in with you once a semester as you plan your time, and more regularly to ensure you're on track – based on the professional, scientific, and personal goals you've set for yourself.
- provide resources to develop your research program and technical skills as you plan the next stage of your career (e.g., PRA –> grad school, PhD student –> postdoc/industry, postdoc –> PI/research lead).
- help you with scientific communication (reading, writing grants and papers, presenting) and provide ample opportunities to engage and network at national meetings.
- connect you with potential collaborators and mentors for scientific and professional growth and reciprocity. Team science is one of several skills you will learn during your tenure with us – you will learn to communicate effectively not just with other computational colleagues but with the admin, grants, and scientific writing teams, experimental and clinical collaborators.

- create a diverse and inclusive safe space for all intersectionalities in the lab to ensure everyone thrives scientifically, professionally, and personally while respecting and supporting their colleagues.
- enable you to pay forward by creating inclusive communities through scientific and technical education and outreach reach opportunities (e.g., R-Ladies, AsiaR, WiSTEM, SACNAS).

8.2.1.1 Mentoring Philosophy | full_post

My experiences as a mentee have varied widely: fantastic professors in college inspired me to start a research career; later, a mentor overlooked my whole dissertation work resulting in prolonged authorship discussion. In my postdoctoral lab, I was the sole computational researcher collaborating with a dozen experimental biologists. I seized this invaluable opportunity to restart my academic career from scratch in a different field (i.e., studying microbial diseases), to learn, understand, and speak the language of both experimental and computational biologists, and to bring these worlds together. Collectively, these experiences have shaped my mentoring philosophy.

- *Opening doors and leveling the playing field* (i.e., not gate-keeping)
- *Lives bigger than work*
- *Collaborative mentoring* (i.e., not top-down advising)
- *Mentoring is not imprinting*

8.2.1.2 Inclusive lab climate | full_post

I have mentored 15+ diverse undergraduate and graduate students. Several joined my lab as first-time coders and have co-authored computational papers; five have contributed to submitted manuscripts (see Bibliography). All these students have had positive research experiences, presented at (inter-)national conferences, and won awards/support from national programs, including NIH-funded BRUSH, NSF-funded REU-ACRES, SROP, and NSURP. Several undergraduate trainees have graduated and started advanced studies at prestigious graduate and medical schools or jobs at pharmaceutical/IT companies. Using lessons learned from these experiences, I will focus on the following key areas to ensure an equitable and inclusive lab climate.

- *Recruiting practices* - e.g., working with the Offices of Inclusion/Diversity, R/Py-Ladies, W+DS, and online groups for minorities in STEM (e.g., Black in Computational Biology, LatinR, AfricaR, AsiaR, ArabR, RainbowR).
- *Safe space for full participation* - for people from all intersectionalities, zero tolerance to discriminatory or exclusionary behavior, appropriate pronoun usage, sustain a culture rooted in mutual respect.

- *Empowering mentees to forge their path* - e.g., co-developing semester plans, conducting professional development workshops within the lab, creating networking opportunities through local/national/international meetings, and tailoring mentoring strategies to each mentee's career aspirations.

8.2.2 Postdocs

As a postdoctoral researcher, you wear many hats besides those of more junior scientists in the lab.

- A postdoctoral position is a training opportunity – you are here to learn new skills and expand your scientific boundaries. You are not expected to know everything, but you should be comfortable (and preferably excited!) throwing yourself into new problems and solving them.
- You are also here to help others learn. Postdocs have considerable experience in many aspects, typically involving academia, research, and more. That experience can be beneficial for scientists who are earlier in their careers. Contribute generously where you can, and make yourself available for others in the group. A rising tide lifts all boats.
- You may work on several existing projects across the lab – either leading them or helping each team navigate research obstacles. Postdocs have already had experience troubleshooting their way through their work in the past, and are expected to be able to leverage that experience by operating more independently. Some projects you work on might be new and higher risk, and some might be stalled and in need of a fresh perspective.
- In addition, postdocs are strongly encouraged to pursue their independent research interests aligned with the group's research interests. For projects that succeed, they should have "future directions" they can take forward into their independent careers in the future.
- Grant writing is a crucial aspect of a postdoc's job. It funds your position and research where possible and, most critically, gives you practice and experience seeking and applying for funding opportunities needed for launching into independent faculty positions.
- Communicating science is a fundamental and essential part of this role, be it through manuscripts, conference presentations, or workshops. Expect to keep busy presenting your work at regional and (inter)national platforms, and use the experience to get your name out there and network!
- Finding your next step is the ultimate goal of your position. For all the roles you have, they should help focus your skillset, CV, and open future opportunities for you to move onwards and upwards towards where you want to end up in life.

8.2.3 Graduate students

8.2.3.1 PhD Students

As a PhD student, you're expected to …

- Strive to be independent and creative.
- Be willing to learn new things and be open-minded to new ideas/directions.
- Actively engage in lab, department, and program activities.
- Attend all required meetings specific to your project, one-on-one, and group meetings. All others will be optional. We encourage you to join optional meetings, so you have a general understanding of the other projects.
- Interact professionally with all your peers and everyone on the floor.
- Establish clear deadlines/academic plans, e.g., comprehensive exam, defense. Plan to graduate within 5 years; finishing your comprehensive exam by the end of your third year (end-of-second-year would be preferable and ideal to keep you on track).
- Mentor junior students by giving primers, helping them troubleshoot anything related to their projects, helping them contact the correct individuals when you can't help them, and answering their questions.
- Have a clear and deep understanding of concepts related to your research project.
- Keep up with the literature and have a sound reading system (update your project/group members and PI of your most recent exciting reads via Slack/Journal clubs).
- Set aside 3-4 hours of productive slots on days without classes for (i) writing code, (ii) reading/writing papers, and (iii) generating results.
- Inculcate good time management skills. Ensure you have an efficient work-life balance to nurture your physical and mental health.
- Write clean and well-documented code.
- Do code review or request review(s) from other lab members at a proper frequency e.g., once a month.
- Keep applying for internal/external funding opportunities (good practice for scientific writing).
- Contribute to grant proposal writing with the PI by proposing new ideas and generating preliminary results.
- [Side projects] Learn more about other projects in the lab and make meaningful contributions to them.
- Communicate well with the PI(s) on research, academic progress, and other professional development goals.
- Maintain a good frequency of one-on-one meetings, especially when you are co-mentored. Do your best to keep both PIs on the same page.
- Have good/proper interpersonal communication with everyone.
- Come prepared for all the meetings by noting your open questions, your next steps, or the results you want to present.

Science communication

- Formal/semi-formal scientific writing, e.g., abstracts, manuscripts, blog posts.
- Give oral presentations in different settings, e.g., group meetings, posters, talks, research updates, and journal club meetings. - Keep well-organized meeting notes.
- Check emails and Outlook lab calendar daily.
- Look out for opportunities that Janani often posts in the lab Slack, the DBMI Slack, or email. Opportunities to look out for are but are not limited to funding, poster events, presentations, conferences, seminars, and courses.

Semester planning

In addition to detailed research goals, set goals for professional and personal development. Below is a general list of what semester planning entails.

1. Academic planning: required/elective courses
2. Take on leadership roles through mentoring or presenting
3. Attend seminars and conferences
4. Volunteer
5. Set recurring meetings with the PI(s) and attend project meetings.

8.2.3.2 Master's Students

- Strive to be independent and creative.
- Be willing to learn new things and be open-minded to new ideas.
- Engage in lab activities.
- Attend all required meetings specific to your project, one-on-one and group meetings. All others will be optional. We encourage you to join optional meetings, so you have a general understanding of the other projects.
- Interact professionally with all your peers and everyone on the floor.
- Establish clear deadlines/academic plans. Some tasks with deadlines are but are not limited to thesis, internship presentations/reports, poster abstracts, and primer presentations.
- Be a team player by helping to mentor junior students by giving primers, helping them troubleshoot anything related to their projects, helping them contact the correct individuals when you can't help them, and answering their questions.
- Commit your work often to Github.
- Work often on developing your computational skills and learning how to apply biological concepts to computational problems.
- Writing clean and well-documented code.
- Have a clear understanding of concepts related to your research project.
- Have good time management skills. Ensure you have an efficient work-life balance to maintain physical and mental health.

- Your work must be reproducible; this applies to the methodology, codebase, software, and data you work on. The following link will take you to the Ten Simple Rules for Reproducible Computational Research. This short paper will give you an insight into some rules you can follow to help maintain reproducibility when doing computational research.
- Communicate well with the PI(s) on research, academic progress, and other professional development goals.
- Maintain a good frequency of one-on-one meetings, especially if you work with multiple PIs. Do your best to keep both PIs on the same page.
- Setting recurring meetings with the PI(s) and attending project meetings.
- Come prepared for all the meetings by noting what questions you have, your future steps, or the results you want to present.

Scientific communication

- Practice your scientific writing, including but not limited to writing abstracts and sections of manuscripts.
- Give oral presentations in different settings. These presentations can occur in group meetings, posters, talks, research updates, and journal club meetings.
- Keep well-organized meeting notes.
- Check emails and Outlook lab calendar daily.
- Look out for opportunities that Janani often posts in the lab Slack, the DBMI Slack, or email. Opportunities to look out for are but are not limited to funding, poster events, presentations, seminars, conferences, and courses.

Semester planning

- *As outlined in the previous section.*

8.2.4 Research professionals (PRAs / postbac, post-MS trainees)

- Lead individual projects, and support other lab members' projects collaboratively, and contribute to new ideas and research directions.
- Perform scientifically rigorous data management and bioinformatic analyses.
- Develop and disseminate a variety of tools designed to access relevant experimental and clinical data.
- Develop and implement complex analysis pipelines, modular functional programming, and data visualization techniques (e.g., for multi-layered -omics datasets)
- Creatively and effectively integrate data from multiple sources to accelerate discoveries; write custom scripts to access databases and analyze data.
- Assist with the design and development of major bioinformatics-related programming projects

- Write custom web tools and R/Py packages for the group and the larger scientific/technical community.
- Present research/technical updates periodically, host journal clubs, workshops/tutorials, and attend all group and project meetings.
- The supportive role can overlap with the project-related scientific tasks, or other technical and software-development tasks like code review and any assistance with coding/environment/installation issues.
- It is in the best and mutual interest of PRAs and the lab to hone and develop scientific, technical, and personnel/leadership skills that will benefit all involved parties, especially the PRAs' professional and career development.
- Work with the PI to make short- and long-term research, professional, and career plans to stay on track towards your next steps.

8.2.5 Undergraduates (Short-term interns/Visiting scientists)

- **Be present.** Attend meetings and bring forth your best effort.
- **Ask for help.** We encourage you to be proactive; ask questions and provide any updates or ideas to our Slack channels.
- **Strive for growth.** It will be challenging, but we want you to keep trying and persist – learning is the main goal, and being receptive and open to constructive feedback is a great way to improve.
- **Give yourself grace.** You've earned a spot in our community, and you belong here. Failure is inevitable with the work we're doing; your work doesn't define you or your abilities. We're all here for you!
- **Stay organized.** Keeping track of your priorities, tasks, and responsibilities will allow you to monitor your progress and make it easier for others to help you. Time management is essential for pacing yourself to achieve your goals.
- **Collaborate.** We encourage you to present your work and discuss it with others frequently. Learn about the projects your labmates are working on, communicate any troubles or issues before they boil over (work-related and not), and keep a positive mental attitude!
- **Own your research.** This is *your* research process, so be sure that you're putting forth your best work and that you continue to practice scientific reading and writing.
- **Take advantage of resources.** There are many avenues for learning in research. Here are a few to get you started:
  - JRaviLab: How to X
  - Slack channels
  - Stack Overflow
  - NIH NCBI
  - Google, Google Scholar
  - ChatGPT

8.3 Code of conduct

8.3.1 Overview

There is zero tolerance for harassment or discrimination in the JRaviLab and at the University of Colorado. These are forms of abuse, and they create a workplace environment that can leave people feeling unsafe and unwelcome. Members of the JRaviLab come from many different backgrounds, and this diversity is one of our greatest strengths.

While this is not exhaustive, examples of unacceptable behaviors include harassment, discrimination, or other unwanted behaviors, verbal or physical, that make others uncomfortable, both at and outside work. This applies to conduct in public or on social media, not just at the job. Protected categories include but are not limited to gender identity and sexuality, physical appearance, size, weight, and disability (of all types), race, ethnic group, age, and religion. These topics are covered in part by the required training modules you will take after employment at the University of Colorado.

You can review the policies from the Office of Equity's Discrimination and Harassment page here, and from the Anschutz Medical Campus' office of Diversity, Equity, Inclusion and Community Engagement here.

We recognize that because of our diverse backgrounds, our experiences with what conduct is considered appropriate may vary, and similarly, no-one should feel afraid to be themselves out of fear of violating an unspoken rule. Instead, it is our collective responsibility to educate each other. If we see or hear conduct that is inappropriate, whether it is targeted at us or other individuals or groups, each of us must commit to calling that behavior out. A joke in poor taste alone won't get anyone terminated, but a pattern of misconduct despite being told it is inappropriate, arguing back or justification of misconduct when asked to avoid such behaviors, or severe misconduct are grounds for discipline.

If you are unsure what constitutes acceptable behavior and where the line is drawn, talk to us! These rules are important, but they are also a socially determined set of boundaries – they are not universally known and universally evident, and it is our collective responsibility to help each other understand what the boundaries are and how to steer safely clear of them. Similarly, if you feel like a comment or behavior might be inappropriate, you do not need to have a justification for feeling upset, you do not need to seek second opinions from others, and you do not need to observe the behavior repeatedly for it to be a problem – all of our individual boundaries, personalities, and histories are what define the rules, and your voice is important. You should always feel comfortable speaking up, especially if you are a lone voice!

If you observe or are the recipient of discrimination, sexual misconduct, or harassment, reports should be made to the Office of Equity. You can read about this process here. Depending on your classification, you may be a mandatory reporter of misconduct, meaning you must report any such misconduct you observe.

8.3.2 Professional Conduct

Details on responsible science, authorship, and the expectations of your role are found throughout this document. Generally speaking, as a member of the JRaviLab, you are a professional researcher, and you can and should take pride in this. We are better for your membership! With this role comes certain responsibilities that go beyond the code of conduct overview mentioned above. Remember that your behaviors represent the lab, all of our research, and even Anschutz and the University of Colorado at large. Treat our fellow scientists in other labs and the general public with respect and understanding, try to avoid being drawn into public arguments on social media (nobody wins these), always be open to learning and re-learning, and do not let ego cloud judgement. We should never seek to use or diminish others merely to climb a career ladder.

As a group, our success and reputation, and the quality of our science and its positive impacts on society all depend on our lab having a sense of social cohesion and psychological safety. This goal is aspirational and does not materialize automatically, but with our collective efforts and daily upkeep, is very attainable.

8.4 Health and wellness

Health, wellness, safety

8.4.1 Inclusive and safe space

The University of Colorado offers trainings in diversity, equity, and inclusion topics, including the Health Equity in Action Lab (HEAL). We encourage you to participate in these trainings, including the Foundations in Equity Certificate Program.

While not required by CU, these modules will introduce you a great range of perspectives, explain topics like implicit bias or microaggressions and how to recognize and interrupt them in ourselves and others, and treat others more equitably and respectfully. Beyond the obvious benefits to our lab culture, these topics are absolutely critical to recognize for scientific study design (e.g. using human data). Being aware of our implicit biases and systemic issues can help navigate potential pitfalls in data collection and interpretation which can affect people worldwide.

Links and details to follow.

8.5 Lab Proceedings

8.5.1 Communication

- Communication within the group | Slack | In-person/Zoom co-work

In all meetings and interactions, it is imperative that lab members are constructive in feedback and respectful of each other. Critiques are always welcome and encouraged, but they should be supportive and aimed at building others up and improving our science, not tearing others down. At the same time, we shouldn't shy away from providing critical feedback! As scientists, we all need regular practice critically analyzing and interpreting what we read and hear, and a friendly environment like our lab group is the best place to work on these skills together.

8.5.2 Meetings and formats

Since communication is key to good science, we meet regularly as a lab in a variety of formats. The details about these meetings can be found here.

8.5.3 Remote work & working hours

At a very broad level, the more time you put into your work, the more you'll get accomplished. However, this is also an obvious oversimplification. Some people prefer a typical 9-5, others thrive with a 10 hour/4 day workweek, and others still find their productivity falls off after 6 hours of work. Adding to this, our work can often be asynchronous, and working remotely can be integrated into a routine as well.

Regardless of your working style, taking breaks is important! Stretch, take a brisk walk, hydrate, enjoy some caffeine (in **moderation**).

If you are working remotely for extended periods, communicate regularly on Slack, and schedule a few co-work times where you and others can log on together and work in a shared virtual space that makes spontaneous interactions possible. Remote work has advantages, but a major drawback is the lack of this spontaneity. Being able to walk to a neighboring desk and ask a quick question, take a shared tea break, and see the faces of the people you work with are real advantages to collaborative science. Some of these aspects can still be done remotely, but they require active effort. Please stay involved like this even if you aren't on campus!

Generally speaking, if you are meeting milestones, participating in project and group discussions, and comfortable with your work-life balance in our lab, the details of your work schedule are flexible. For a diverse group, a schedule that accommodates everyone necessarily requires compromise. Your exact schedule will come down to your role in the lab, your preferences, and the group's availability. There are some basic rules and tenants to be aware of.

8.5.4 Hours

For full-time members (e.g., PRAs, postdocs, grads), expect to put in 40 hours of work per week on average.

For part-time members (e.g., undergraduates during the semester, interns, and other volunteers), you might be in the range of 10-30 hours a week typically.

These ranges are estimates, and will vary across people and over time. We never want to find ourselves in a crunch, but deadlines sometimes do pile up, and some weeks may require more hours. At the same time, some weeks will be lighter, breaks are encouraged, and working to the clock, or overtime should not be glorified either. Most importantly, maintain a comfortable work-life balance that leaves you wanting to come back for more, and keeps you far from the burnout line! If you ever feel stressed about your schedule/workload, talk to your PI & group to see how we can change things.

Presenteeism isn't a healthy mindset, and health and productivity rank ahead (in that order!) of simply being present.

- Working remotely | CU Remote Work Agreement

8.5.5 Leave policy

- For staff: The University of Colorado's leave policies are available here.
- For graduate students: Details may vary per your specific graduate program's handbook, but the Graduate School offers basic guidelines here.
- Because our group is tightly collaborative, please plan non-sick leave ahead of time to best fit all schedules when possible.

8.6 Publication, Authorship & Research Misconduct

8.6.1 Publishing

To quote the Foreign Secretary of the Royal Society, Dr. Mark Walport, "Science isn't finished until it's communicated." If work isn't documented, written up, peer-reviewed, and made publicly available, it's no different than if the work hadn't been performed in the first place. For our group, that might involve writing clearly commented, clean code, submitting it for code reviews, and sharing it through GitHub, or it could involve writing a manuscript and submitting it to scientific journals. In any case, it is imperative to work towards sharing reproducible, repeatable, and replicable science.

8.6.2 Authorship

It's often said that publications and citations are the currency of science. How does one become an author on a paper? What even is a paper? When is a project ready to publish? Many of these questions are best answered through conversations with peers and collaborators, but there are resources available to help provide context.

- A paper, a publication, a manuscript, or whatever you might hear it called is a formal write-up of a scientific project. It typically follows a format referred to as IMRAD for Introduction, Methods, Results, and Discussion. These refer to the order of sections of the paper, which roughly presents the introduction to the problem or knowledge gap, the methodological approach or techniques the authors decided to use to address the issue established in the introduction, what the results and data outputs of those methods are, and the interpretation of those findings and how they relate back to the problem established at the start. While the exact formatting varies journal-to-journal, this structure generally captures how scientific results are written and reported.
- Having your name on a paper's author list typically requires a substantial intellectual contribution. Without your work, the story in the manuscript would not have been complete. Typically, the position of the authors in the list reflects the amount of credit they deserve for the work done, and the PI(s) who oversaw the project receive(s) the last author position(s) to signify that it was their lab(s) who performed the work. Many people make minor contributions that do not make the cut for the author list, and they may earn a space in an Acknowledgements section. Discussions about project responsibilities and the positions contributors will earn on a manuscript should happen early and often. The details of this vary from field to field and lab to lab, but a good overview can be found in this article, interviewing many different scientists across disciplines..
- What kinds of contributions are important? Researchers have asked this question enough times to lead to the creation of a framework called CRediT for Contributor Roles Taxonomy. While this isn't the final say on what types of contributions there can be on a manuscript, many journals have adopted the CRediT system to specifically assign which authors contributed in what ways in a paper, so it's definitely worth a look.
- What does it mean if you're an author? No matter your position in the author list, it means you are literally assigning your name to work performed. Even if you only worked on one small part of the analysis, you must be familiar with all aspects of the paper. Your authorship is a statement that you vouch for the content, the methods, and the conclusions made in the paper. While honest mistakes do happen and can slip through to publication, all authors should do their best to ensure everything was conducted to the highest standards for scientific rigor. Mistakes that significantly change the interpretation or outcome of an experiment, or worse, intentionally misleading or fraudulent data, can seriously affect or even end scientific careers for authors on erroneous

papers. Authorship should be taken seriously because contributing to the larger body of scientific knowledge can and does have real impacts on the world and lives in it.

8.6.3 Research Misconduct

- If you are concerned about misconduct by fellow scientists, talk to them first! Science is inherently collaborative, and everybody brings a unique perspective – you may notice something that others have missed, and simply asking about it can course-correct a project. If you don't feel satisfied with the answers, or if a researcher is not acting in good faith, it is your responsibility to report potential misconduct. In cases where you aren't certain but still have concerns, you can speak with a Research Integrity Officer at CU and discuss whether the issue qualifies as misconduct before escalating to a formal report.

9 How to X

9.1 Get started

If you are new to computational biology and R programming, join the `#bioinfo-primers` channel. Use the `#help-x` channels to ask for help/answer others' questions on R/Py programming, shell scripting, version controlling, or anything else that's general and not project-specific. Use the corresponding `#proj-x` channels for all project-related questions.

Check out the Slack tips in the pinned posts in #help-proj_management to get oriented since you are new to Slack (the channel used to be `#howto-slack`)!

To re-familiarize yourself with R/Python/Unix, check out these two resources in addition to Slack | CompBio gists and R-Ladies East Lansing. If you are new to R-Ladies Aurora, R-Ladies East Lansing, and Women+ Data Science, check them out and join Meetup-RLA/Meetup-RLEL and their Discord/Slack to remain apprised of upcoming events and to connect with the local R and data science communities.

If you find other useful resources, please add them to this list (or share them with me).

9.2 Learn R

To learn R, I would recommend getting started with the pinned posts in #courses-primers.

A couple of helpful GitHub repositories - https://github.com/jananiravi/workshop-tidyverse (Intro to `R's tidyverse package` — handy to learn right away) - Other R workshop materials from our R-Ladies East Lansing chapter: https://github.com/rladies-eastlansing - Interactive tutorials with learnr & swirl. - R for Genomics from Data Carpentry - R on HPC

- Coursera
  - Intro to R programming and tidyverse
  - Data visualization and Dashboarding with R specialization
  - Getting Started with Data Visualization in R
  - … and more | explore by topic, duration, skill-level

9.3 Helpful Links to learn more about Machine Learning

- YouTube Videos
  - [Machine Learning from Scratch by AssemblyAI] (https://www.youtube.com/watch?v=p1hGz0w_OC
  - [MIT Deep Learning Course] (http://introtodeeplearning.com/)
  - [Deep Learning by Assembly AI] (https://www.youtube.com/watch?v=dccdadl90vs&list=PLcWfeUs gYRlexc6xvscdvHqX)
  - [Understanding Tensors by Dan Fleisch] (https://www.youtube.com/watch?v=f5liqUk0ZTw)
  - [Understanding Neural Networks] (https://www.youtube.com/watch?v=aircAruvnKk)
  - [Basic Computer Parts Explained] (https://www.youtube.com/watch?v=ExxFxD4OSZ0)
- Articles:
  - [Transformers] (http://jalammar.github.io/illustrated-transformer/)
- Coding Practice Sites
  - [LeetCode] (https://leetcode.com/)

Go-to books (also in pinned posts on Slack)

- R for Data Science (for tidyverse and such)
- Hands-On Programming with R (for base R) Intro to Git, GitHub resources

9.4 Use VPN

https://www.ucdenver.edu/offices/office-of-information-technology/software/how-do-i-use/vpn-and-remote-access

9.5 Learn Git/GitHub

- https://happygitwithr.com/ Happy Git and GitHub for the useR (connecting git/GitHub w/ R)
- Git and GitHub learning resources from GitHub
- Git 101
- Coursera Intro to Git and GitHub course

9.6 Read/write/present

- Read papers
- Make a poster
- Write a paper
- Writing in the Sciences on Coursera

9.7 Code

- Write, work with, and manage source code and data
- Prepare for and carry out code review
- Share data
- Write an R package
- DBMI software engineering team tips & tricks blog posts

9.8 Plan your semester/year

Templates on yearly/semester planning and professional development are available here.

9.9 Remote server work (JRaviLab server & Alpine HPC)

For computing that requires high performance hardware and computing clusters, we utilize two different remote servers.

9.9.1 JRaviLab server

- A single high performance machine used only by our group.
- To request access, contact the system administrator `shaddai.amolitos@cuanschutz.edu` by sending him your CU username (e.g., the CU auto-generated `ravijan` instead of `janani.ravi@cuanschutz.edu`) and a brief message that you will need access to the server. CC janani.ravi@cuanschutz.edu, so they can both verify your access.
- If you are new to remote server work, then it maybe helpful to learn about using an ssh config for managing your remote hosts.

9.9.2 Alpine HPC

- Alpine is the HPC cluster for all the University of Colorado campuses, including Anschutz.
- There is extensive documentation about getting setup
- At the moment, a web shell is the only access option for Anschutz members. This is different from a typical SSH login, and it is best to follow the official, latest Alpine documentation.

Whenever possible, we highly recommend using the VSCode extension which provides an IDE on the remote host without having to worry about server-side installation of other IDEs like RStudio or Jupyter.

9.10 Others

- Career development week
- Remote work | CU remote work policy | CU DBMI remote work agreement

10 Resources

10.1 Funding

We strongly encourage trainees to apply for scholarships/fellowships or other grants to help support their independent research and to get acquainted with the process of developing competitive research and personal statements.

Here are a few scholarship and funding opportunities:

10.1.1 Grad students

- Graduate student funding opportunities (c/o JHU)
- @CUDenver
- NSF GRFP
- NIH F30, F31
- Graduate tuition for in-state, out-of-state, non-resident, international students
- Immigrants vs resident aliens

10.1.1.1 Training grants

https://www.cuanschutz.edu/graduate-programs/biomedical-sciences-program/resources/grants-and-fellowships

10.1.1.2 AWIS

https://awis.memberclicks.net

10.1.2 Undergrads/postbacs

- Colorado Biomedical Informatics Summer Training Fellowship for URM Mail Caitlin Moloney with questions: caitlin.moloney@cuanschutz.edu
- Loan repayment program
- University of Colorado Anschutz Medical Campus Preparation in Interdisciplinary Knowledge to Excel (PIKE) PREP (URM + citizen + BS in biomedical field)
- For high school, undergraduate, and graduate/professional students

10.1.3 Postdocs

- Beautiful central resource maintained by JHU
- Postdoctoral fellowships for international scholars
- NIH F32, K99/R00

10.1.4 Other

- Anschutz Funding and Fellowships
- Ludeman Center for Women's Health Research

10.2 CU resources

10.2.1 Health and Wellness

CU Anschutz: Mental health| Health and Wellness Center

MSU: Mental health| Student Health & Wellness| Fitness

10.2.2 Women in STEM

10.2.3 JEDI

Justice, Equity, Diversity, and Inclusion

- Central Office of Diversity, Equity, Inclusion, and Community Engagement
- Office of Disability, Access, and Inclusion
- Office of Diversity and Inclusion
- DEI education, outreach, and recruitment

10.2.4 Writing Center at CU Anschutz

11 Meetings

Please update this semester's meeting schedule here.

11.1 Format

11.1.1 Weekly lab meetings

- These provide a space for everyone to share updates and roadblocks, and depending on the needs of the group, these meetings can be in a roundtable format where everybody who has updates can share them briefly (<10min per person), longer form updates or presentations for 1-2 people (<30min per person), or the entire slot can be reserved so one person can give a practice talk or major project summaries (<60min per person). We operate a Google spreadsheet where members can put themselves down for specific topics, times, and dates. In all cases, these weekly lab meetings are required for all members to attend.

11.1.2 Weekly project-specific meetings

- These give lab members under a broadly shared project/topic umbrella a space for more detailed discussions and to seek specific feedback and help from their peers in the same or similar topics. These meetings are only required for those in the relevant associated projects, but are open to any members curious to sit in, learn, and contribute. Like the weekly lab meetings, lab members can schedule themselves for specific topics or times here. Because of their more focused scope, there may be times where these meetings can be quick updates dropped in Slack instead, and all involved lab members should communicate regularly to ensure each meeting is necessary.

11.1.3 One-on-one meetings or small group meetings

- These more direct meetings can be set up as-needed. To easily schedule a one-on-one with Janani, please use this booking link.

11.1.4 Journal clubs & Primers

Sign up here **Journal clubs** - Journal club serves as opportunities to present interesting new research papers from other groups. For journal clubs, all members of the lab must read the selected paper ahead of time and be prepared to help their peers explain it. Likewise, to be respectful of the time commitments of others, the presenter must share their selected paper at least a few days before the meeting, and preferably the week before to give everyone a chance to read it thoroughly.

- The format of journal club is largely up to the presenter, but it should walk briefly through the background to the problem, the question or need the paper addresses, how they did the work, what the results were, and how it ties back to the larger problems in the field and future directions. While the presenter can take the lead and walk the group through everything, journal clubs are a lot more engaging and educational with participation, so having the audience explain figures and interpretations is an easy way to ensure people are learning instead of just listening.

Primers - Technical primers can be great practice on teaching a topic by sharing how-to or tutorial lectures on subjects of your choosing. These are great opportunities to share a skill or approach with the group so we can all benefit from it.

- Additionally, these are spaces where we can invite an outside presenter to share with us (for example, the Department of Biomedical Informatics' Software Engineering Team, or the CU Office of Diversity, Equity, Inclusion & Community Engagement, or a scientist with subject expertise from another lab group). It is up to the group collectively to decide which primer topics are appropriate.

11.1.5 Co-work sessions

- Organized as desired, and can be in-person or virtual. Have a paper or a grant deadline? Need to do some code review? Looking to catch up on recent literature? A co-work session is a great place to get these done in a focused but still social setting. These typically work best if you bring a task or to-do list, but are also good to set up regularly if you're working remotely for any extended periods of time to keep in touch and allow more natural interactions with your colleagues.

11.1.6 Weekly software engg meetings

- Meetings with the DBMI SET on software and UI/UX design and implementation, as well as work on our JRaviLab server, software applications like MolEvolvR, or work on the CU Alpine HPC cluster.

11.1.7 (Bi)weekly/monthly collab meetings

- Less frequent except during sprints, these are meetings with our collaborators on joint projects. They may involve sharing goals, blockers, and milestones, or might involve a collaborator working as a consultant to give advice or feedback from an outside perspective on a project.

11.2 Logistics

- GitHub issues/project for detailed project to-do's
- Shared Outlook Calendar for meetings, deadlines, RLEL & other events!
- Semester planning meeting (once per sem, during the first month)
- Slack for everything else!

11.3 Schedule and times

Always confirm the exact meeting schedule with our shared Outlook Calendar and Sheets document, but below are the usual meeting times.

11.3.1 Monthly/Weekly individual check-ins:

Book via Outlook bookings.

11.3.2 Group meetings (~15min per person)

- Weekly group meeting (All members) | Fri 10.30a MST (wk)
- Journal clubs/Bioinfo primer series | Thu 11a MST (wk)
- Software engg (MolEvolvR, server, & such) | Mon 1p MST (wk) | DBMI-SET (CU)
- Microbial G2P (MolEvolvR/CompGenomeR/AMR) | Mon 2.30p MST (wk)
- Host response and disease/drug signatures | Thu, 9a MST (wk) | w/ KrishnanLab (CU)
- AMR ms | Fri 11.45a (wk)
- EEPID | Tue, 12.30p (wk) | w/ WaleLab (MSU)
- AMR Staph | Mon 10a (wk) | w/ HorswillLab (CU)

11.3.3 DBMI seminar schedule

Posted by the DBMI seminar committee | 2023-24 schedule

11.3.4 Monthly Group Socials

<TBD | spontaneous>

- Random discussions/catch-up
- Online games: https://jackbox.tv | https://drawbattle.io
- Coffee/tea or ice cream for local folks
- Once in a while, we can dedicate the group socials to fun topics close to your heart (e.g., music, sports, books, food, …)!

12 Offboarding

We are aware that career plans change, and that is perfectly ok. The Ravi lab always encourages you to pursue your future endeavors and dreams. Ensure you do your best to make Janani aware of any changes in your career plans so the offboarding process can run smoothly.

12.1 Ready to head out?

We are delighted to have been a part of your research life. We wish you great laurels as you move on to the next phase of your career.

Please make sure you have checked these boxes before leaving our group.

- ☐ Please return any devices, cords, or computers that belong to the lab.
- ☐ All your code is on GitHub
- ☐ All your processed data files/figures/reports (<100mb) are on GitHub
- ☐ Large data files (raw/processed) are on the server (and backed up)
- ☐ All your scripts and data files are well-annotated with appropriate `README` files
- ☐ Added detailed status report of where things – what was tried, what worked/didn't work, where the scripts/data files are, what remains to be done (within the scope of the project, and clear next steps)
- ☐ You have reoriented me and at least 1-2 other project members with the precise status (and next steps) of the project and the location of files
- ☐ You are not a full member of our GitHub organization, Slack workspace, Google Drive, or Outlook Calendar anymore but will retain access to the project channel/repo until publication (or complete transition to other project members).
- ☐ If you are switching from being a full member to a collaborator, you will now only have collaborator privileges on Slack, GitHub, and Google Drive, until you are done with the project/your term with the collaborator.
- ☐ If you have worked with us for a considerable period of time, you will remain a part of `#the-continuum` channel on our Slack.

- ☐ Leave and update us of any changes in contact information for authorship purposes in case we need to reach you and add you to the list of authors for all the work you contributed to the published project.

12.1.0.1 If you need more information on the leave policy, please refer to the appropriate link at the bottom.

Undergraduate and Masters Students: Student Employment Handbook

Ph.D. Students:Graduate School Policy for Vacation and Leave

Good luck!

12.2 Stay in touch

Webpage | PI | Twitter | Mastodon | Email