“Lab” Manual

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Welcome!

Welcome to the Schumacher group in the University of Edinburgh's Centre for Regenerative Medicine (CRM), Institute for Regeneration and Repair (IRR)! To ensure that we are all able to do our best work while preserving our individual and collective well-being, this Lab Manual sets out clear guidelines on what is expected of every lab member, including me, the PI.

This Manual is constantly evolving, and suggestions for additions and change are always welcome. The last thing I want to do is to be prescriptive about how to behave, and so the main purpose of this document is rather to clarify any ambiguities that might otherwise arise.
I hope you are excited about getting started, and that your stay here will be a happy and productive one.

This lab manual was inspired by several others, and borrows heavily from them (mainly this one, and this one). If you're a PI or a trainee in a different lab and want to write your own lab manual, feel free to take inspiration from this one.

When you join the group, please read this manual and send Linus an e-mail indicating that you have done so.

Expectations and Responsibilities

Everyone

Big Picture

Science is hard. But it's also fun. We want to make sure that everyone experiences a positive, engaging, hostility-free, challenging, and rewarding work environment. To maintain that environment, we all have to do a few things.

- Work on what you're passionate and curious about, work hard at it, and be proud of what you achieve. To help with this, try and find what motivates you (to do science).

- Scientists have to be careful. Don't rush your work. Think about it. Implement it. Double and triple check it. Incorporate sanity checks. Ask others to look at your code or data if you need help or something looks off. It's ok to makes mistakes, but mistakes shouldn't be because of carelessness or rushed work. Sloppiness wastes time in the long run.

- We all make mistakes. If you do make a mistake, you should definitely tell your collaborators (if they have already seen the results, and *especially* if the paper is being written up, is already submitted, or already accepted). We admit our mistakes, and then we correct them and move on.

- There is no tolerance for academic misconduct. This includes plagiarism, data fabrication, manipulation, selection ('cherry-picking'), and is different from a simple mistake due to its intentional nature. The University takes a very hard line on misconduct, and rightly so: it is damaging for your studies, employment, and even future career, and ultimately, such misconduct goes against the very aim of science. A different related but important point, however, is the motivation behind such misconduct: people may be tempted to engage in misconduct because of severe pressures to publish. If you find yourself facing such pressures, please talk to someone about it! These motivations are real, and can be addressed; misconduct is not the solution.

- Support your colleagues. Science is something we do together, and never in isolation. So help your colleague if you see them struggling, even if they are not working on the same project as you. Critically evaluate each other's work, and be open to critiques from others, but always remember that **criticism of the work is not criticism of the person**.

- Respect your fellow team members. Respect their strengths and weaknesses, respect their desire for quiet if they need it, and for support and a kind ear when they need that. Respect their culture, their beliefs, their sexual orientation.

- If you're struggling, tell someone (feel free to tell Linus!). Your health and happiness come first. The group looks out for the well-being of all its members. We are here to help. It's ok to go through hard patches (we all do), but you shouldn't feel shy about asking for help or just venting. See also the CRM intranet page on mental health first aid http://intranet.crm.ed.ac.uk/crm-mental-health-first-aid

- If there is any tension or hostility in the lab, something has to be done about it immediately. We can't thrive in an environment we aren't comfortable in, and disrespect or rudeness will not be tolerated in the group. If you don't feel comfortable confronting the person in question, tell Linus. In any case, tell Linus.

- If you have a problem with Linus and are comfortable telling him about it, do! If you aren't comfortable, then tell a fellow team member (for smaller issues) or your external mentor (for more serious issues).

- Stay up to date on the latest research, by using Google Scholar alerts and/or getting journal table of contents. Also consider following scientists in the field on Twitter

- Have a life outside of the lab, take care of your mental and physical health, and don't ever feel bad for taking time off work. You're expected to use your holiday allowance, and you cannot work productively if you do not have any down time.

Small Picture

There are a few day-to-day things to keep in mind to keep the group running smoothly.

- If you're sick, stay home and take care of yourself. Because you need it, and also because others don't need to get sick. If you're sick, reschedule your meetings for the next day (or the next couple of days) as soon as you can.

- Hours: I do not expect you to work a certain number of hours, but I do expect you to get the work done. How and when you choose to do that is up to you: this is a major benefit of academic work, and one I am keen to preserve. That said, I recommend not working evenings and weekends, and keeping some sort of regularity in your work pattern. So I do expect to see everyone reasonably regularly in the office during core hours (10am – 4pm) on weekdays, since it is there that you will have quickest access to resources and people – and importantly, your expertise will also be accessible to others. Science is collaborative (even if you are working on your own project), and to maintain this collaborative atmosphere people need to be present.

- Flexible working locations: if you have no obligations (meetings, experiments, etc.) in the lab, you can work from home or elsewhere, but this cannot happen all the time for reasons described

above.

- Turn off your workstation computer if you're using one and not running things overnight. Be careful not to turn of a workstation that someone else may be using remotely!

- Keep your office space tidy. Eating at your desk is fine occasionally (the breakout space is nicer though), but clean up food waste, crumbs, spills, and be mindful of food smell and eating noises affecting others working around you.

- Be on time for your meetings: respect that others have packed days and everyone's time is valuable.

Principal Investigator

All of the expectations above, and I promise to also…

- Support you (scientifically, emotionally, financially)
- Give you feedback on a timely basis, including feedback on project ideas, conference posters, talks, manuscripts, figures, grants
- Be available in person and via e-mail on a regular basis, including regular meetings to discuss your research (and anything else you'd like to discuss)
- Give my perspective on where the group is going, where the field is going, and tips about surviving and thriving in academia
- Support your career development by introducing you to other researchers in the field, promoting your work at talks, writing recommendation letters for you, and letting you attend conferences as often as finances and workloads permit
- Help you prepare for the next step of your career, whether it's a post-doc, a faculty job, or a job outside of academia
- Care for your emotional and physical well-being, and prioritize that above all else

Post-Docs

All of the expectations for everyone, and you will also be expected to…

- Work on and develop your own research project (developed with Linus's help, who will help shape the project but expect you to be the driving force behind your project and to make creative, original contributions. Ideally postdocs (will develop to) work more like colleagues *with* the PI.
- You can spend up to around 10% of your working time on projects not directly related to the group, e.g. finishing old publications or starting new projects
- Help train and mentor students in the group (both undergraduate and graduate) when they need it – either because they ask, or because I ask you to. If you feel like this is taking up too much of your time, please raise the issue with me.
- Present your work at departmental events, at other labs (if invited), and at conferences
- Apply for grants or fellowships if and when appropriate, and help with grant applications if I ask you to. It's good to get experience writing grants – and if you get them, you'll be helping out the team as well as yourself (because you'll free up funds previously allocated to you)
- Apply for jobs (academic or otherwise) when you're ready. A post-doc is not a career. If you think you'd like to leave academia, that's completely fine – but you should still treat your post-doc seriously, and talk to me about how to best train for a job outside academia

- Challenge me (Linus) when I'm wrong or when your opinion is different, and treat the rest of the group to your unique expertise

Graduate Students

All of the expectations for everyone, and you will also be expected to…

- Develop your thesis research. Your thesis should have at least 3 substantial chapters that contain publishable research. Much of your work has to be done independently, but remember that others in group (especially Linus!) are there to help you when you need it. Linus will get you started with a project, but expect that you will ultimately be the one to lead the transformation of that project into a successful thesis. Your independence should increase with your time in graduate school.
- Engage in a period of intense and collaborative thinking when they join the group (a month or two of intense reading when you are first starting is not only acceptable but encouraged) and periodically thereafter to help shape your project.
- Help mentor undergraduate students in the group when they need it – either because they ask, or because I ask you to.
- Present your work at departmental events, at other labs (if invited), and at conferences
- Apply for travel grants when attending conferences.
- Think about what you want for your career (academia, industry, science writing, something else), and talk to Linus about it to make sure you're getting the training you need for that career
- Make sure you meet all University deadlines (e.g., for your thesis) -- and make sure Linus is aware of them!
- Prioritize time for research. Outreach and teaching are important, but ultimately your research gets you your PhD and prepares you for the next stage of your career.
- Consult the CRM PhD student info http://intranet.crm.ed.ac.uk/phd-student-info

Undergraduate and Masters Students

All of the expectations for everyone, and you will also be expected to…

- You should be coming in every week, and scheduling enough time to get your work done
- You will generally work on projects led by graduate students, postdocs, or the PI. However, you should strive to make your own intellectual contributions to the project you work on.
- You should also attend group meetings when your schedule permits, present at one of these group meetings, and submit a write-up of your research by the end of your project
- Make sure you meet all University deadlines (e.g., for your thesis) -- and make sure Linus is aware of them!

Code of Conduct[1]

Essential Policies

The group, and the university, is an environment that must be free of harassment and discrimination.

1 This was adapted from the code of conduct found here and here.

The group is committed to ensuring a safe, friendly, and accepting environment for everybody. We will not tolerate any verbal or physical harassment or discrimination on the basis of protected characteristics. We will not tolerate intimidation, stalking, unwanted photography or video recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome sexual attention.

If you notice someone being harassed, or are harassed yourself, tell Linus immediately. If Linus is the cause of your concern, then reach out to the postgraduate representative in the Centre.

Scientific Integrity

Research (Mis)conduct

The group, and University of Edinburgh, is committed to ensuring research integrity, and we take a hard line on research misconduct. We will not tolerate fabrication, falsification, or plagiarism. A big problem is why people feel the need to engage in misconduct in the first place, and that's a discussion that we can have. If you are feeling pressured to succeed (publish a lot, publish in high impact journals), you should reach out to Linus and we can talk about it – but this pressure is something we all face and is *never* an excuse to fabricate, falsify, or plagiarize. Also, think about the goal of science and why you are here: you're here to arrive at the truth, to get as close as we can to facts about how life works. Not only is research misconduct doing you a disservice, it's also a disservice to the field. And it risks your entire career. It is never right and never worth it. Don't do it.

Reproducible Research

If you gave someone else your raw data and/or code, they should be able to reproduce your results exactly. This is critical, because if they can't reproduce your results, it suggests that one (or both) of you has made errors in the analysis, and the results can't be trusted. Reproducible research is an essential part of science, and an expectation for all projects in the lab.

For results to be reproducible, the analysis pipeline must be organized and well documented. To meet these goals, your code should also be commented, and commented clearly. This includes any pre-processing of the data, to running models, to statistical analysis. We all know what it's like to sit down, quickly write a bunch of code without taking time to comment it, and then having no idea what we did a few months down the road. Comment your code so that every step is understandable by an outsider. Finally, it is highly encouraged that you use version control (e.g., Git in combination with GitHub) to keep track of what code changes you made and when you made them, as well as sharing code with others. Linus's GitHub is https://github.com/ljschumacher (but don't take his code as a standard, try to do better!)

Authorship

At the start of a new project, the student or post-doc taking on the lead role can expect to be first author (talk to Linus about it if you aren't sure). Linus will typically be the last author, unless the project is primarily under the guidance of another PI and Linus is involved as a secondary PI – then Linus will be second to last and the main PI will be last. Students and post-docs who help over the course of the project may be added to the author list depending on their contribution, and their placement will be discussed with all parties involved in the paper. If a student or post-doc takes on a project but subsequently hands it off to another student or post-doc, they will most likely lose first-authorship to that student or post-doc, unless co-first-authorship is appropriate. All of these issues will be discussed openly and as early as

possible, and you should feel free to bring them up if you are not sure of your authorship status or want to challenge it.

Team Resources

Wiki
The group wiki (TO BE CREATED) is, well, a wiki for the lab. It has all of the information you need to get started, including tasks that need to be done upon arrival, forms, programming and stats tips, and links to information about accessing the high-performance computing cluster and group workstations. Edit it when you obtain information that will be useful for others to know! Ask Linus to be added as a member.

See also the CRM wiki http://intranet.crm.ed.ac.uk/wiki

General Policies

Hours

Being in the office is a good way of learning from others, helping others, building camaraderie, having fast and easy access to people you need, and being relatively free from distractions at home (e.g., your bed or Netflix). A flexible work schedule is one of the great perks of the academic lifestyle, but at least initially you should still treat it as a full-time job (unless your contract or course guidelines say otherwise) and show up to the office regularly. Ultimately you should work the number of hours necessary to move your project forward, but need not linger in the office for appearance's sake. That said, if you or Linus feel that you are not making satisfactory progress on your project, Linus will discuss your work hours with you more specifically. Together, we will determine whether you need to work more hours or whether you may simply need to switch approaches (work smarter, not harder) or projects.

My primary concern is that you get your work done, so if you find that you are more productive at home (people in the offices can be chatty sometimes), feel free to work at home occasionally (I do it about once a week). If you have no meetings, and no other obligations that day, it might be a good day to work at home – but you can't do this all the time, and I expect to see everyone in the office on a regular basis. For students, I understand having to be away for classes and courses, but show up to the office on a regular basis when you don't have those obligations.

To encourage group interaction, try to be in most weekdays during 'peak' hours (assuming no other obligations) – e.g., between 10am and 4pm. This is not a hard rule, you can work at home occasionally (I do about once a week), and I understand other obligations. But keep it in mind.

I will sometimes send emails outside of normal working hours. For the most part, I try not to, but sometimes I do. I do not expect you to respond until you are back at work (ignore me!). I do not expect there to be cases when I suddenly and urgently need something from you over the weekend (e.g., for a grant deadline), but should I anticipate that happening, I will bring it up in advance so we can plan accordingly. All this said, I realize that being told you can ignore my messages might not take away the stress of *seeing* my messages if you check work in the evenings or on weekends. If my off-hours messages are unwelcome and cause distress, please talk to me, and I will be better at not bothering you during your time off.

Although I occasionally work evenings or weekends, I try to only do that when absolutely necessarily. Please respect that by making sure to give me enough heads-up about impending deadlines so that I can

get things done for you (e.g., write letters of recommendation, give feedback on manuscripts, etc) while maintaining my work/life balance. For more details, see Deadlines.

Holidays

As a rule of thumb, I expect people to take their fair share of holidays. This may differ for students and postdocs (check your contract or course guidelines).

PI Office Hours

In addition to weekly meetings (see below), and occasionally dropping by your desk, you can find Linus in his office. If he's not currently in a meeting or on a call, feel free to ask for a chat. He will always say yes, though sometimes he can only spare a couple of minutes or might ask you to let his finish typing a sentence, or ask you to come back later in the day. If you can't see him in his office, please send an e-mail if it can't wait until the next day.

Meetings

Group Meetings

Group meetings (schedule tbc) are meant to be a forum for group members to present project ideas and/or progress to get feedback from the rest of the group. Projects at any level of completion (or even not yet started!) can benefit from being presented. These meetings can also be used to talk about methods, statistical analyses, new papers, and career development. For paper discussions, everyone must come to group meeting having read the paper and prepared with comments and questions to contribute.

Participation is key. Don't be afraid to share "stupid" ideas: you don't have to make the most perfect brilliant comment in order to spark an important discussion. Also don't be afraid to ask clarifying questions throughout the presentation if you don't understand something that the speaker is saying. It's very important that we all stay on the same page.

Each group member is expected to present at least once every semester. These meetings are informal, and you can do what you wish with your slot (you don't even *have* to use slides) – just be prepared to contribute something substantive, and discuss with Linus in advance of the meeting. Group members are also expected to attend every meeting (obviously, illnesses, doctor appointments, family issues, etc are a valid reason for missing a meeting). Undergraduate students are encouraged to attend as often as possible (assuming it fits in their course schedule).

Sometimes (most times while our group is small) we have meetings joint with Guillaume Blin's lab at the CRM. You should also attend lab meetings of your biological collaborator, it's a good way to immerse yourself in the specific biology.

We will also use group meetings (or ad-hoc scheduled meetings) to prepare for conference presentations and give people feedback on job talks or other external presentations.

Individual Meetings

At the beginning of each semester, we will set a schedule for weekly meetings. Each graduate student and post-doc will have a 45 min. slot set aside to meet with Linus (though I expect senior postdocs to need to meet less often). If scheduling conflicts arise (e.g., because of travel), we can try to reschedule for another day that week. If there is nothing to discuss, feel free to cancel the meeting or just drop by for a brief chat.

Linus will meet with undergraduate students at least every other week (or according to need); post-docs and graduate students should meet with any undergraduate mentees on a regular basis.

Linus is sometimes busier than he'd like to be, and as a result needs your help to stay organized and make sure nothing falls through the cracks. Do make the most out of individual meeting time by:

1. coming prepared (make a note of talking points or a draft agenda beforehand, even better if you also send it to Linus in good time for a meeting (e.g. the day before)), and remind him what you have talked about in the last meeting and/or need to discuss now
2. being proactive (tell Linus what you need and when you need help)
3. taking notes of decisions and action points during the meeting, and talk them through with Linus if you are at all unsure (or even better follow up with agreed actions after meeting via e-mail)

Apart from individual meetings, you can always come knock on my door. As a rule of thumb, try to solve the problem or find the information yourself first, but if you're stuck for more than a day, you should've asked me for help.

Other Local Meetings

You are encourage to attend internal and external seminars at the CRM (schedule here), as well as journal clubs, and seminars in other centres or departments in Edinburgh.

Deadlines

One way of maintaining sanity in the academic work is to be well organized. This is essential because disorganization doesn't just hurt you, it hurts your collaborators and people whose help you need. When it comes to deadlines, tell your collaborators as soon as you know when a deadline is, and make sure they are aware of it the closer it gets. Don't be afraid to bug them about it (yes, bug Linus as well).

Give Linus at least one week's notice to do something with a hard deadline that doesn't require a lot of time (e.g., reading/commenting on conference abstracts, filling out paperwork, etc).

Give Linus *at least* two weeks' notice (preferably more) to do something with a hard deadline that requires a moderate amount of time (e.g., a letter of recommendation).

If you want feedback on research and teaching statements, or other work that requires multiple back-and-forth interactions between you and Linus before a hard deadline, give his as much time as you can; at the very least three weeks.

For manuscript submissions and revisions (i.e., which either have no deadline at all or only a weak deadline), send drafts to Linus as soon as you have them, and bug him to give you feedback if he hasn't responded in a week – papers are important!

Presentations

Learning to present your research is important. Very few people will read your papers carefully (sad, but true) but you can reach a lot of people at conference talks and posters. Also, if you plan on staying in academia, getting a post-doc position and getting a faculty position both significantly depend on your ability to present your work. Even if you want to leave academia, presentations are likely to be an important part of your job. Additionally, every time you present your work, you are representing not just yourself but also Linus and your collaborators.

It is therefore highly encouraged that you seek out opportunities to present your research, whether it is at departmental talk series and events, to other labs (within or outside of Edinburgh), at conferences, or to the general public. If you are going to give a presentation (a poster or a talk), be prepared to give a practice presentation to the group at least one week ahead of time (more for job talks, which require much refining). Practice talks will help you feel comfortable with your presentation, and will also allow you to get feedback from the group and implement those changes well in advance of your real presentation.

Templates for posters will be available, and you can use those as much or as little as you'd like. Some general rules for posters should be followed: minimize text as much as possible (if you wrote a paragraph, you're doing it wrong), make figures and text large and easy to see at a distance, label your axes, and make sure different colours are easily discriminable. Other than that, go with your own style. Like talks, you should plan to practice your poster presentations. It is very important to be able to give a short (~5 min) punchy overview of your research for poster goers. Remember they can always follow up with more detailed questions.

Linus is also happy to share slides from some of his talks if you would like to use a similar style, and may ask you for your slides, too. You'll get a lot of feedback on your talks in any case, but other people's slides might be helpful to you as you are setting up your talk – but give full credit when using someone else's slides. As with posters, feel free to go with your own style as long as it is polished and clear.

Recommendation Letters

Letters of recommendation are important for getting new positions and grants. You can count on Linus to write you a letter, though it's hard to really know someone if they have only been around for a few months, and in such cases the letter will likely reflect that.

If you need a letter, notify Linus as soon as possible with the deadline (see Deadlines for guidance), your CV, and any relevant instructions for the content of the letter. If the letter is for a grant or fellowship application, it helps to also include your specific aims. If the letter is for a faculty position, also include your research or teaching statements. In some cases (especially if short notice is given, but hopefully only very rarely), you may also be asked to submit a draft of a letter, which will be modified based on Linus's experience with you, made more glamorous (people are much too humble about themselves!), and edited to add anything you left out that Linus thinks is important. This will ensure that the letter contains all the information you need, and that it is submitted on time.

Data Management

tbc

Open Science

We're all for open science, so group members are encouraged (well, required) to share their code and data with others, whether they are in the group or outside of it. Within group, you can share your code and data whenever you like. But do not share your collaborators' data with the outside world until they agree to. This gives us an opportunity to work with the data to meet our needs (including grant needs!) before releasing it for other people to use. We will always try to make data and code publicly available upon publication of the results.

We will also share our work with the world as soon as we are ready, which means preprints! The group policy is to upload a preprint of a manuscript simultaneously with initial submission to a journal, but if you have concerns about that please discuss with Linus. The preferred preprint server is bioRxiv (or arXiv for more mathematical manuscripts). You should also share PDFs of your paper with whoever asks.

Software

We support open source code, and thus the preferred programming language in the group is python, although we may occasionally use Julia if we need specific packages, and may have some legacy code in Matlab.

Funding

Funding for the group currently comes from Linus's start-up package from University of Edinburgh, and an ISSF strategic award.

At some point, you will likely be asked to provide a figure or two for a grant Linus is writing. Relatedly, you are entitled to read any grant Linus has submitted, whether it is ultimately funded or not. Aside from being a good opportunity to learn how grants are written, this will also allow you to see his vision for the group in the years ahead. Feel free to ask Linus to see any of his grants.