

Advice for prospective PhD students

I have collected some notes of advice for Ph.D. students based on my own experience, having supervised more than a dozen of PhDs, and other similar documents that I have been collecting/reading over the years. These notes aim to be triggers for discussion and reflection when the students start their Ph.D. or think about and develop their work, or their career.

§{1} What I expect from the Ph.D. students High motivation, excitement, and curiosity, hard work, very high ethical and scientific standards, willingness to learn + to experiment + to explore, (some degree of) independence, willingness to collaborate and to interact with others, ability to focus and to meet deadlines.

§{2} What can the students expect from me Support, general guidance, identification of research directions + relevant methodologies + relevant internal or external expertise, feedback on general organization and structure of papers and grant applications, "design" and conceptualization of manuscripts, creation of opportunities, promotion of an exciting and healthy work environment, open door policy for science or any other matters of interest for the students, willingness to share my experience and my ideas, willingness to discuss papers and thesis (availability to give feedback – see next note), their organization, structure and flow, data visualization, and to provide feedback on all aspects of the science.

§{3} What the students should not expect from me Solving (your) minor technical problems or small details (but I will be **very** happy to discuss challenging questions), proofreading your manuscripts or your thesis, which these days can be done via automatic mechanisms (but I will do it for papers if I consider it to be strictly necessary, for very high profile publications, work in collaboration with other teams, or for the first paper in the Ph.D. to help you identify gaps that you might need to improve in your writing skills). I will nevertheless copy-edit your manuscripts.

§{4} Your Ph.D. research project(s) When you first design your Ph.D. research project most of it will rely on the vision or the interests of the advisor. As time evolves, I expect the student not only to "own" the initial project but also to shape it according to her/his own expertise, interests, and research, such that the different stages of the Ph.D. represent a stairway to scientific independence (**note**: scientific independence is a concept

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different from scientific loneliness or scientific isolation).

§{5} Work Earning a Ph.D. degree represents hard work. It is closer to a marathon than to a 100 m sprint. This implies steady and continuous (small) steps, trying to make progress everyday, and trying to take good advantage of time. There are many different types of tasks with lots of diversity: read the literature, write results/papers/abstracts/grants, prepare presentations, think, code, analyze data or make theoretical calculations - if stuck in one task try to use your time in something else, but always try to make an advance and to progress everyday – as John M. Dawson, my mentor in the US, used to say: “Small steps” – small concluded tasks can also be a source of motivation for other more challenging steps (or as a source of distraction whenever stuck in some problem/detail).

§{6} Have fun The work should be, nevertheless, very fun, not only because of the discoveries and the science but also because of the camaraderie and the interactions with other scientists.

§{7} Have ethical and scientific high standards “Do not cut corners” and abide by the most rigorous ethical standards. In terms of the research questions you want to pursue, do not forget to **aim high** and explore the most exciting and demanding scientific questions in our field of research. Read papers and discuss with other scientists, know the “classic papers”, attend seminars, and read the literature to understand what are the most exciting directions. Discuss, think, seek advice, and plan carefully.

§{8} Service Collaborate in the tasks at GoLP, in particular outreach and communication activities; this is not only good service for the community, and helps everyone for things to be developed more smoothly but also an excellent way to improve your soft skills and your CV. If you think you can manage your research work with other tasks, I also advise you to collaborate in teaching activities (ideally in classes that I am teaching) – teaching is the noblest activity one can pursue. This allows you to develop other very important skills (public speaking, organization, and selection of information, preparation of classes, examinations, and evaluations) and it also is an excellent way to enrich your CV.

§{9} Publications Publications are important as they demonstrate your

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contribution to science (your results only become science after being communicated, disseminated, and discussed by peers), your achievements, the techniques and methodologies that you master, your writing style, and the style of your science. Your name (and other people's) is going to be there upfront and other scientists will read it – your reputation will be established by the quality, clarity, and style of your publications. You should make an extra effort to perfect your writing style (many good examples can be provided for you to learn and to improve this important part of the work) – of course, being (scientifically) creative and having outstanding science/results is central to the quality of the publications but do not overlook the other aspects of publications. Ideally, you should finish your Ph.D. with several publications (3-4, ideally published) with some high-profile publication(s) that should be the highlight of your Ph.D. thesis. Note, however, these are only typical numbers – what you should value is **high quality** (this is not equivalent to publishing in high-profile journals) - high quality (of the science, of the write-up, of the presentation, of the topic) is what builds your reputation and make you stand out.

§{10} Presentations You should consider all presentations, talks, and interactions with other scientists as job talks ("You only get one chance to make a first impression"). It is very important that presentations are prepared with care, and with very high quality. You are not doing a Ph.D. in design so use the templates available such that you do not spend time thinking about the formatting, fonts, and colors – also pay attention to other excellent presentations and their style and use their best ideas. Have a pitch ready to describe your work (and your passion):

- a one-minute pitch for an informal encounter on the elevator;
- a three-minute pitch for a quick tour of your poster at a conference;
- a five-minute pitch for a quick discussion over coffee e.g. at the coffee break of a conference;
- a fifteen-minute pitch (with some possible slides that you can have on your phone or your laptop) for a meeting at a conference, for a visitor, or when you meet someone visiting whom you want to present your work.

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§{11} Discussions One of the most exciting (and important) things in science is the opportunity to discuss and present your ideas to other bright people, to discuss your ideas, or be involved and discuss other people's ideas or work. These discussions are very important as they serve to fill gaps in your knowledge, help you in trying to understand how novel your work is, obtain feedback on the work, and identify possible future directions. In the interactions, be courteous, polite, and respectful – one can disagree without being unpolite and rude. It is always important to keep all doors and all roads open, and this is only possible if discussions are taken at a professional level and are not taken personally (so please avoid that). Most discussions are also taken over electronic media (email or instant messaging/social media) and some of these interactions can be misinterpreted (emails are particularly critical in this respect) - whenever you feel communication can be/is been misinterpreted use face-to-face communication to clarify and to avoid misinterpretations.

§{12} Prepare your next step Your Ph.D. is just the first/entrance step of a scientific career (or some other career). You should start to think about your next step typically one year before you finish your Ph.D. There are many factors that can come into play in making these decisions - do not forget to seek advice. Depending on your choices/preferences there are a number of actions that must/can be taken in advance to facilitate and prepare your next step (do not wait for the day on which you finish your Ph.D.) I can help you in the preparation for your next step by providing feedback, writing reference letters, contacting other groups, or calling up my colleagues to seek opportunities. Do not hesitate to reach out.

§{13} Build a network During the Ph.D. and after that, your network is an important asset (whatever you decide to do after the Ph.D.) – cultivate and take good care of the collaborations you are involved in (reliability, respect, professionalism, meeting deadlines with your collaborators). Your fellow students are also an important part of your network, as well as all the faculty members that you interact with (in the group, department, in collaborations, conferences, and other professional settings).

§{14} Seek advice Do not hesitate to seek advice from your Ph.D. advisor or your mentor (everyone wants you to be successful!) – this is an essential advantage of more experienced people that can share their per-

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spectives (informed by their own experience and from others that they have interacted with) or put their own network/contacts to work and to create opportunities for you.

§{15} Get a mentor(s) Having other people to discuss your career and your decisions is very important – a mentor can help you navigate some of the choices that everyone needs to take. The mentor can be approached informally (someone that you consult when making decisions) or someone that you approach and specifically ask to be your mentor. Whatever your option or your preference, having a mentor is always important. Of course, as your advisor, I can also serve as a mentor (but it is always important to find someone that is somehow more independent than the work that you are doing at the moment). I can provide you with some references on how to approach this important aspect of your present (and future) career.

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