Why do a Ph.D. at CDS?

CDS offers course and research-based degree programs. The course program is **M.Tech. (Computational and Data Sciences)**, and the research programs are **M.Tech. (Research)** and **Ph.D.**. The Ph.D. program at CDS is the *flagship program* of the department, and it is these doctoral programs that have helped IISc secure the rank as top university and top academic institution in India. As a result, it is the Ph.D. students at IISc who gain the most from our leading rank and reputation, and also contribute the most to the success of the Institute.

The Institute and the department strongly encourage applicants to join the Ph.D. program if they have the enthusiasm for research and advancing technology. However, many of the applicants to CDS are new to research, and you may be wondering *"Is a Ph.D. right for me?"*. This FAQ will try to address some of the misconceptions of a Ph.D., and offer our view on what it takes to do a Ph.D. at the CDS department of IISc, and how you can benefit from it.

1) Why should I consider a research program instead of a course program?

- A research program gives the opportunity to develop advanced skills in a focused area, and make a tangible intellectual contribution. It is about *depth* rather than *breadth*.
- The research programs at CDS have *much fewer course credit requirements*, e.g., 12 credits for M.Tech.(Research) and 24 credits for Ph.D. as part of the *Research Training Program (RTP)*, compared to 40 credits for M.Tech.(CDS) course degree. The set of RTP courses are completely flexible and decided by the student and their advisor. This allows you to take courses that train you in your research area, and gives more time to do guided research.
- A research program also gives you *flexibility in the topic* that you wish to conduct research on, even if you are new to it as long as you are passionate about it. There is less time-pressure and you get the chance to pick up the necessary skills and make a sustained impact.
- Students in a research program *work closely with an advisor* right from the start of their program and get to interact and collaborate with other students in the research lab. This offers additional mentorship from peers, and a strong research support network. The students get to use all facilities of that lab, in addition to the facilities of the department.
- Lastly, the *career options* once you complete a research degree are much broader and international in nature. You will also get a higher quality and payscale job compared to someone with just a course-based degree.

2) I have never done research before. Is it still advisable to enroll for a Ph.D.?

- That is perfectly fine. We have many students who join without prior research experience. Even those who have conducted research earlier may not have worked at a top institution like IISc, and will need to be retrained. The courses taken as part of the *research training program* in the first 2 semesters, along with the research experience gained in the lab and advisor you work, with will prepare you for research.
- At the same time, you should already be strong in your *undergraduate courses and fundamental concepts*. During the admissions process, we will test your level of preparation in your undergraduate subjects and your ability to apply those concepts. Prior research experience is not required.

3) I heard a Ph.D. takes 5, 6, 7, 8+ years to complete. I don't want to commit that long!

- That is not true. IISc has firm guidelines on how long a Ph.D. degree can take, and students MUST complete their doctoral studies latest by 6 years. At the CDS department, the average time to graduate with a Ph.D. is *less than 5 years*.
- Research programs offer students the flexibility to *accelerate their graduation time* if they perform well, and have made a mark in their research topic. This is up to the student and their advisor, and a motivated student can finish rapidly. In fact, in some research areas, the longer you take, the less interesting that topic becomes since technology is fast-changing.

4) *Isn't a Ph.D. much more difficult than an M.Tech. (Research) degree?*

- Not particularly. In both Masters and Ph.D. research programs, you first get research training in an area, then identify a suitable dissertation topic, and finally work on that topic for the rest of your degree. The key difference between the Masters and Ph.D. programs is that a doctoral student can select a *topic that is more interesting and impactful* since they can spend more time doing research. The more in-depth a student works on a research problem, the more meaningful the outcomes and better the future prospects.
- In fact, one can consider the 2-3 years spent in the M.Tech. (Research) program to be the preliminary part of doing a Ph.D. It takes just 1-2 years longer than a Masters student for a Ph.D. student to complete -- *this maximizes your academic investment!* It is a big bonus compared to doing a Masters first and then separately a Ph.D., which can take 7+ total years.

5) *What if I realize that I am not cut-out for research after I start my Ph.D. program?*

- This is a reasonable concern since the true meaning of research will be evident only after you start your research. We understand this and offer a chance for doctoral students who feel that a Ph.D. is not right for them to exit with a M.Tech.(Research) degree, once they fulfil the Masters' degree requirement. This is a decision taken in consultation with the student, advisor, department, and the Institute. Nothing in the degree or transcript will state that the student transitioned from a Ph.D. This way, there is no impact on future academic or career prospects, and the risk is limited.

6) *Are there more seats for Masters than Ph.D. programs? Is my chance for admission better if I apply for a M.Tech. or a Ph.D.?*

- Since IISc is the top research university in India, all departments including CDS place an *emphasis on admitting Ph.D. research students*. In fact, 65% of all students at IISc are in the Ph.D. program. Given a pool of applicants in an admissions cycle, priority will be given to Ph.D. applicants, and M.Tech. (Research) students will only be considered subsequently in the merit list. So if there are more high quality applicants to the Ph.D. program, then there will likely be fewer seats for Masters' students. So we encourage students to consider the information provided in this FAQ and apply for the Ph.D. program.
- At the same time, good students with exemplary performance in the admissions interview always stand a fair chance of being considered for the Masters if they have applied only for it.

7) *Is my only career option after graduating with a Ph.D. to become a professor? That sounds boring!*

- No. In fact, only a small fraction of students who graduate with a Ph.D. end up joining becoming a faculty, and the global career options are plenty.
- A majority actually join the *industry*, and at a much higher pay scale than their Masters' degree colleagues. There are also industry jobs that require a Ph.D. degree, and research labs like Microsoft Research and IBM Research hire only doctoral graduates. The career advancement is also much faster. Since many low-tech jobs in the industry are being replaced by Artificial Intelligence, the job prospects for doctoral scholars are going to be much higher as they bring in higher order thinking and skills that cannot be automated. The quality of the work that is done in such research positions is also more interesting and cutting-edge, compared to basic coding and product development for students without a Ph.D.
- Many Ph.D. graduates also go on to start *startups* based on their research (e.g., Google was started based on Brin and Page's doctoral topics, even though they dropped out). A doctoral degree trains a student to become independent and focused contributors, and to innovate on a daily basis. This is the essence of entrepreneurship. IISc also offers training on incubation and translation, and the department offers training on writing funding proposals. That's why many startups and venture capitals, including Flipkart, Accel and Airwoot, hire Ph.D.'s or are led by them.
- Ph.D. graduates also have the option of joining universities and government labs as *scientists and postdocs*. These allow you to conduct research as part of a team on projects of national and international importance, but do not expect you to teach courses or advise students.
- Lastly, if you realize that you enjoy academic research and do wish to become a faculty at top universities worldwide, a Ph.D. is a requirement. *Once you join IISc, you will realize that faculty labs are more like a high-energy startups rather than a cushy government job :-)* And a Ph.D. from IISc is the best you can get in India to prepare you for a faculty position!

8) *I am interested in working/studying abroad after my studies at IISc. Does a Ph.D. from IISc help?*

- Indeed, and this is common. IISc is the top university in India according to national and global rankings (QS, THE). We are also rank No. 8 in the world for small universities, which means more personalized attention to students. While IITs are well known for their B.Tech. Graduates, *IISc is internationally famous for our Ph.D.s!* Many of our graduates join top multinationals in India and abroad, in addition to postdoc positions at universities across the world for further training. In fact, one of the perks of doing a Ph.D. at IISc is the chance to attend international conferences several times and establish a network of global colleagues. This and your advisors' contacts can help you secure a position at prime institutions worldwide.
- At the same time, if you do wish to return and work in India long term, you can always use your IISc Ph.D. to get placed at top postdoc positions or industry labs internationally, and return back to India when you are comfortable. Most faculty at IISc have international doctorates, post-doctorate and/or industry experience, and can advise you on this.

9) *I hear that the pay for students is low. Can I survive for the duration of a Ph.D. on that stipend?*

- IISc currently offers all Ph.D. students a scholarship of Rs.25,000/month for the first 2 years, and Rs.28,000/month for the next 3 years. This is periodically revised by the Government of India. All students are also provided on-campus hostel accommodation and mess facilities. The hostel and tuition fees are nominal. Students also have access to the Gymkhana sports facilities, various campus cultural and recreational groups, and a clean-green environment in the heart of the Bangalore city that is just a short ride from top restaurants and malls. *All of this means you have more than Rs.15,000/month for your expenses*, which is generous. In fact, this is not too different from an entry-level industry position once you deduct the housing costs and other expenses in a modern city like Bangalore!
- In additional, Ph.D. students can also apply to *prestigious fellowships* from the Government of India, and industries from India and globally. *These are open only to doctoral students.* At the top end, the *Prime Minister's Fellowship* provides students with up to **Rs.8.7 lakhs per year**, while the *Visvesvaraya fellowship* for Electronics and IT offers **Rs.35,000/month**. TCS, Google, IBM Research and Facebook also have global fellowship programs for PhD students, with up to **US$3000/month** given as fellowship. Given that you are a student at IISc, your chances of securing such a fellowship is much better than any other university in India!

10) *I am a female student. Is Ph.D. right for me? Does IISc provide a suitable environment for women students?*

- Yes and yes!
- The essence of research is to take a fresh perspective on existing problems, or identify novel problems that can be solved. So this requires a *diversity of views* when approaching the research area. Globally, there is a growing recognition of the importance of gender diversity in research and academia, particularly in the STEM (Science, Technology, Engineering, Mathematics) areas, to *help solve hard research problems*. As a result, there are specific programs to improve the enrolment of female students and employees in universities and industry. Special scholarships such as the Google Women Techmakers fellowship are available, and the Indian government also has programs from the Department of Science and Technology to support Women Scientists.
- IISc and CDS value diversity. About 25% of students at IISc are female and we hope to increase this number of the coming years. We make all possible arrangements to accommodate specific needs of individual students to ensure their academic success and a productive career. IISc also has the *Women in Science, Engineering and Research (WiSER)* group that offer a supportive network of female students, faculty and industrialists to address specific concerns. Prof. Rohini Godbole from IISc has even compiled a book on the leading women scientists of India, Lilavati's Daughters, to serve as role models. A research career also offers flexible timings rather than a 9AM-5PM corporate job, and this can help with work-life balance as well.