

Computer and systems sciences subject board: Guidelines

The graduate program in Computer and Systems Sciences conducted by the School of Technology and Computer Science (STCS), TIFR, will follow the guidelines and procedures set out in this document. These revised guidelines apply to the students joining the graduate program in 2015 or later.

Contents

1 Overview	2
2 Requirements for Ph.D. registration	2
2.1 Course requirement for Ph.D. registration	2
2.1.1 Waiver of course requirement	2
2.2 Project	3
2.2.1 Project waiver	3
2.3 Qualifiers	3
3 Requirements for Master of Science degree	4
4 Requirements for Ph.D. degree	4
5 Minimum load requirement	5
6 Requirements for M.Phil. degree	5
7 Core courses	5

1 Overview

The graduate program leading to a Ph.D. degree will consist of two specialist streams:

- *Computer Science*
- *Systems Sciences*

STCS runs a Ph.D. program and an Integrated Ph.D. (I-Ph.D.) program. The requirements (courses, project, qualifier exams, etc.) for the Ph.D. degree are specified below. The guidelines below allow for reduced course requirement for students entering the program with an M.E./M.Tech. degree (i.e., postgraduate in professional courses). Students entering with a three-year bachelor's degree will be enrolled in the I-Ph.D. program.

2 Requirements for Ph.D. registration

In order to register for Ph.D., the student must successfully fulfil the following three components:

- Course requirement for Ph.D. registration
- Project
- Qualifiers

I-Ph.D. students must also satisfy all the requirements for the M.Sc. degree (see § 3 for more details).

In addition, the student must register with an advisor in the chosen stream (students are encouraged to approach members of the faculty early enough to find potential advisors).

These requirements should be completed within one and a half years from the date of joining the program (two years for I-Ph.D.).

Failure to complete this requirement will result in the student being asked to leave the program. Students who do not fulfil these requirements have the option of leaving with a Master of Science (M.Sc.) degree by satisfying the requirements of the M.Sc. degree within two years of their joining date (see § 3 for more details).

2.1 Course requirement for Ph.D. registration

- The student must have cleared at least four core courses in their respective stream (see § 7 for list of core courses). Course waivers can be used to meet this requirement.
- To clear a course, the student will require a B or better course grade. The student should have no more than two B grades among the list of courses they wish to use for registration.

Although not a requirement for registration, students are expected to clear at least six courses in the first two semesters, either by taking them or by obtaining course waivers. It is further recommended that the course requirements be completed within a year and a half from the date of joining the program.

2.1.1 Waiver of course requirement

Students who feel they have sufficient prior exposure in the core subjects, may apply to the subject board for a waiver.

- A course waiver can be granted by the subject board after conducting an examination to evaluate the background and competence of the student in that course. A course grade will be assigned based on the performance in the examination.
- Waivers can be granted *only* for the courses listed in § 7.
- Such a waiver can enable a student to register early. However, the student still needs to satisfy the degree course requirements (see § 4 and § 3) by clearing courses in the program.

2.2 Project

- An exploratory project will be completed under the supervision of a faculty member of STCS.
- The project will have a load equivalent to four courses and should be completed in the period Jun-Dec immediately after the second semester. I-Ph.D. students may choose to do this during Jan-Jul after the third semester.
- To clear the project requirement, a grade of B+ or better must be attained.
- The project requirement must be completed within one and a half years from the date of joining the program (two years for I-Ph.D. students).
- Students are encouraged to approach a faculty member during their first two semesters. Students must register for their project at the end of their second semester (deadline in May, see Academic Calendar for exact deadline). I-Ph.D. students may choose to register at the end of their third semester (deadline in December).
- The project will be evaluated in December based on a project report and a presentation. Projects of I-Ph.D. students who elect to register for their projects in December will be evaluated next July.

2.2.1 Project waiver

- A student joining with an M.E. or M.Tech. degree, who has completed a two-semester project as part of that degree may apply for a waiver of the project requirement.
- The subject board may grant a waiver to such a student after evaluating the relevance and quality of the project work. The evaluation will be based on the project report and/or a presentation.
- Project waiver is only for the purpose of registration. All students, including those who obtain a waiver, should register for the project in the period Jun-Dec immediately after the second semester (I-Ph.D. students may choose to do this during Jan-Jul after the third semester). Those with a waiver may take the project with a reduced load of four credits and such projects will be evaluated based only on a presentation. However, taking the project with a reduced load will not allow a student to satisfy the project requirements for the master's degree.

2.3 Qualifiers

The third requirement for Ph.D. registration is the qualifier.

- The qualifier will consist of a written exam and an interview consisting of a paper presentation and an oral exam.
- Students will be eligible to appear in the qualifying examinations after clearing the required courses for registration.
- For the qualifiers, students will select three courses from the set of courses offered in the previous year, subject to the condition that at least two of the courses are in the listed topics of their respective stream (see § 7). The choice of the three courses needs to be approved by the subject board.
- Qualifiers will be held twice a year, in the months of January and July.
- Students should preferably take the qualifying exams within one year of their date of joining the program (one and a half years for I-Ph.D. students).
- Students will be graded either *Pass* or *Fail* in the qualifier.
- Students who do not qualify in the first attempt may be allowed a second attempt to qualify within another six months.

- Students must complete their second attempt (if required) at the qualifying exams within one and a half years of their date of joining the program (two years for I-Ph.D. students).
- Students who fail in the qualifying examinations even after the second attempt will not be allowed to continue in the Computer and Systems Science Ph.D. program.

3 Requirements for Master of Science degree

The requirements for the grant of a master's degree are as follows.

- The student must clear eight courses with at most four B grades.
- The student must complete a project in STCS with an B+ or a better grade. (In particular, a waiver of the Ph.D. project requirement based on a project done elsewhere will not enable a student to meet this requirement.)
- The student must submit a project report which will be evaluated by a committee appointed by the subject board.

Students who fulfil these requirements will be awarded a master's degree as follows based on whether they graduate with a Ph.D. degree.

- Students who complete the Ph.D. program will be awarded a master's degree along with their Ph.D.
- If the student drops out of the Ph.D. program (e.g., by failing to clear the qualifying exams), but has fulfilled the above requirements for a master's degree, then the student will be eligible for a master's degree at the time of leaving.

4 Requirements for Ph.D. degree

Subsequent to registration, the requirements for the grant of Ph.D. degree are as follows.

- *Course requirements:*
 - The student must clear at least eight courses with at most two B grades among the list of eight courses they wish to use towards their Ph.D. course requirement. I-Ph.D. students must clear at least ten courses with at most three B grades.
 - For students with an M.E./M.Tech. degree, the subject board, following an internal evaluation of the student's background and preparation, may reduce the course requirement to six courses.

These courses may include the four courses the student uses for the Ph.D. registration. A course cleared through a waiver for Ph.D. registration cannot be used to meet this course requirement.

- *Synopsis:* Towards the end of the Ph.D. program, the student (in consultation with their advisor) is required to submit a synopsis of the thesis to the subject board. The subject board shall appoint a committee to evaluate the synopsis. The synopsis can be submitted to the TIFR University Cell once it is cleared by the synopsis committee.
- *Thesis:* The Ph.D. thesis is to be submitted within six months from the date of the synopsis submission. The thesis will be evaluated as per the rules of the TIFR Graduate School (see <http://www.tifr.res.in/~gsoffice/>).

5 Minimum load requirement

- While in the program as a full time student, the students are required to carry a minimum load requirement equivalent to three full courses at all times. This requirement can be fulfilled either by enrolling in courses or by enrolling with an advisor for research. Typically, in their first year the students will fulfil this requirement exclusively through courses.
- Students must enroll for their courses/research by the registration deadlines mentioned in the academic calendar.
- Course registration must be approved by the corresponding course instructor while research registration must be approved by the STCS faculty member with whom the student is working.

6 Requirements for M.Phil. degree

An M.Phil. degree may be conferred as an early exit option to a student who has registered for a Ph.D. program but opts not to complete a Ph.D. thesis. This student must already have a Master's degree in a related area. A student is then required to

1. Meet the specified course requirements for Master of Science degree (see Section 3).
2. Submit an M.Phil. thesis, which comprises original work and may be at least one third in magnitude compared to an acceptable Ph.D. thesis. This thesis will be evaluated by at least one external examiner. As with the Ph.D. thesis, a student would need to defend this thesis to an examining committee.

The course work used to meet the requirement of the M.Phil. degree cannot be used towards fulfilling any other degree requirement under the Computer and Systems Sciences Subject Board. In particular, the student cannot be awarded a Master of Science degree based on the same course work.

7 Core courses

This list may change with time to accurately reflect the research focus of the faculty.

Core courses in Computer Science

- Mathematical foundations for computer science
- Algorithms and data structures
- Probability theory
- Automata and computability
- Complexity theory
- Semantics of computation
- Mathematical logic
- Algorithmic game theory
- Program verification
- Quantum computing

Core courses for Systems Sciences

- Mathematical foundations for systems sciences
- Probability theory
- Algorithms and data structures
- Advanced probability
- Communications
- Detection and estimation theory
- Information theory
- Machine learning
- Optimization
- Quantum information processing

Updated: 31 July, 2018