

HOMI BHABHA CENTRE FOR SCIENCE EDUCATION

TATA INSTITUTE OF
FUNDAMENTAL RESEARCH

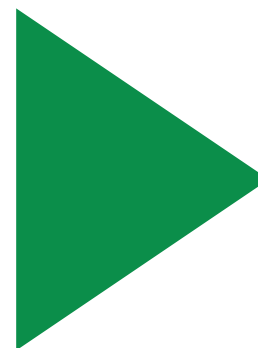
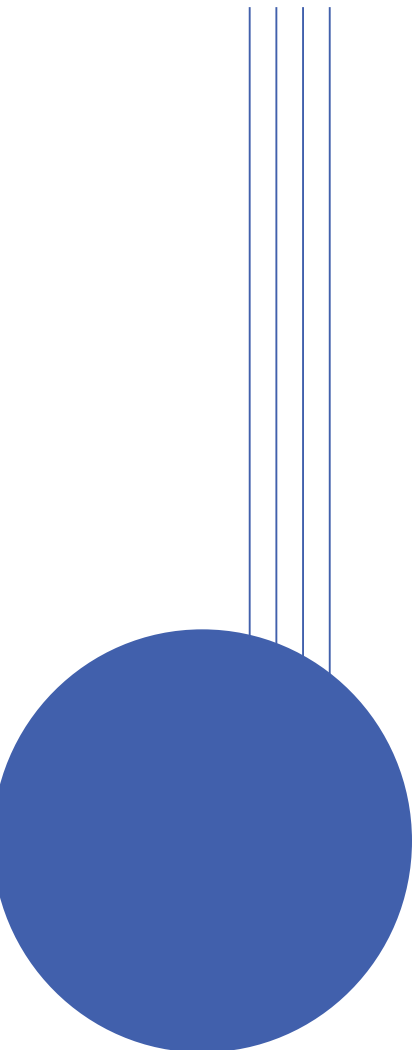
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**INFORMATION BOOKLET
FOR RESEARCH SCHOLARS**



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Designed by Santanu Dutta, HBCSE—TIFR.

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1 ● Introduction to the Graduate Programme in Science Education at HBCSE

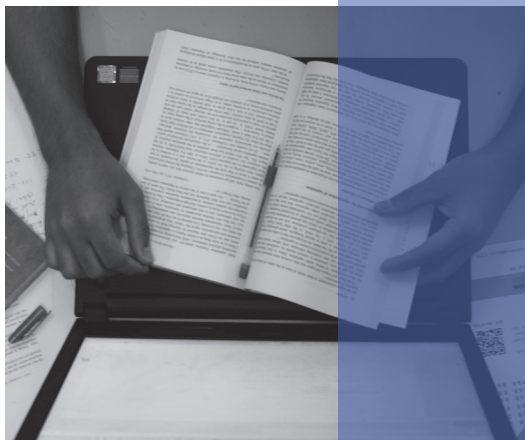
Welcome to HBCSE, a national centre of TIFR. You are now a research scholar in the centre's unique Ph.D. program in Science Education. The core mandate of this highly interdisciplinary program is to train and mentor thought and action leaders in science and mathematics education. Scholars contribute to, and eventually lead, the redesign of the Indian education system, particularly to meet the following intertwined objectives:

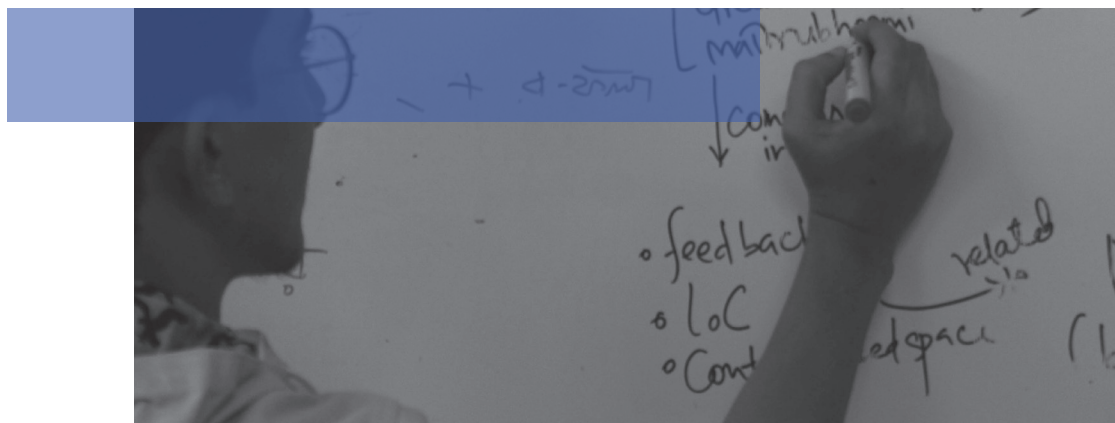
- Make science and mathematics learning and teaching accessible to everyone
- Raise the quality of science and mathematics learning and teaching to international levels

As part of their Ph.D. thesis projects, HBCSE research scholars have developed a range of models to meet these twin objectives. Examples include: new pedagogies that help improve science and mathematics teaching and learning, analysis of existing curricula based

on emerging theoretical frameworks, explorations of alternate curricula that help develop social values, and design of pedagogical and curricular models based on new computational media.

These thesis projects illustrate some of the possible ways to re-imagine science and mathematics education in India. Some of these ideas could eventually become part of the education system, based partly on advocacy efforts undertaken by HBCSE. However, the central contribution of these thesis projects – and the Ph.D. program in general – is not these projects themselves, but a fundamental change in the research scholars' thinking and motivation, and leadership based on this radical shift. The program facilitates the development of wide and deep perspectives on the nature of science and education, as well as their interconnections. It also provides ways to rigorously operationalize the ideas emerging from these perspectives – into systematic studies, data analysis and implications.





The program offers you the freedom to choose your own research topic within science and mathematics education, and pursue it systematically, to produce scholarly output at the international level. The facilities and resources available to you in this pursuit include a very good library, well-equipped laboratories, access to international journals, travel funding (to visit research groups in your area of interest and attend international conferences), access to local schools to conduct studies, support staff (for study design, data collection and data analysis), ongoing national-level projects, resource generation camps, teacher workshops, and close academic linkages with related groups within the country and abroad.

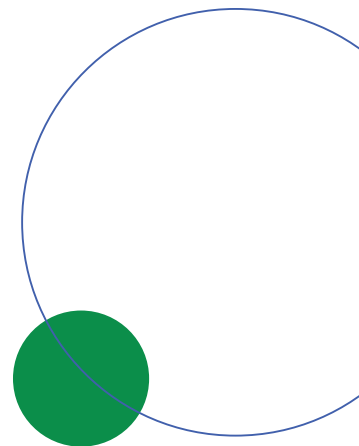
Scholars who join the program move from just practicing science or education, to being reflective practitioners of science as well as education. A central focus of the program is facilitating this shift, partly through course work and conversations—which examine theories, models and methods from education research, philosophy, sociology and cognitive science—and partly through the interdisciplinary thesis project. The depth, breadth and rigor provided by this interdisciplinary process is unique in India, and HBCSE alumni have built on this training to create their own career trajectories—in academia, education, research and elsewhere.

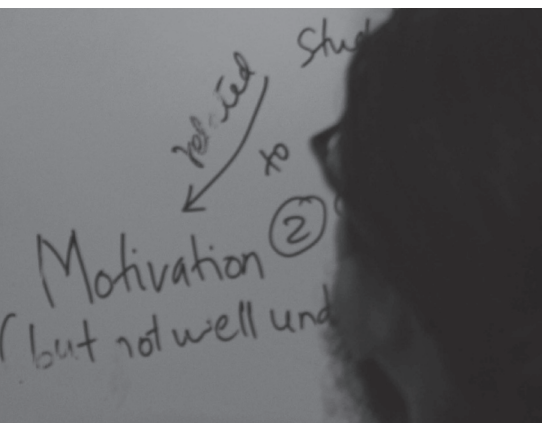
The main milestones of the program include course work (around 12 courses), a field project, two comprehensive exams (one written, one oral), a research study proposal (defended in an open seminar), data collection for the thesis study, at least one international journal publication based on the thesis study, synopsis of the thesis (defended in an open seminar), thesis submission for external reviews, and final thesis defence. Funding and hostel accommodation is provided for five years, contingent on the scholar meeting the academic requirements of the program (see page 9 for details).

Hikes and picnics are organised to farms, parks and beaches around Mumbai. Scholars have access to the very green BARC campus next door, which offers a range of cultural activities, including music, dance, yoga and martial arts classes, as well as concerts by eminent artists. Finally, Mumbai is a very dynamic and culturally diverse city, well worth exploring.

A good interdisciplinary Ph.D. program is mostly built by students, extending their diverse interests, to build active collaborations with groups in India and outside. The elements are in place, five years of building is ahead.

Have fun, enjoy, learn.





2

Tata Institute of Fundamental Research Deemed University: Rules and Procedures

(Framed under Bye-law 6.2 of the Rules and Bye-laws of the TIFR)

The Tata Institute of Fundamental Research has been conferred the status of a deemed university by the University Grants Commission. The institute will function under the direction of an Academic Council chaired by the Director, TIFR. This document sets down the basic guidelines under which the Deemed University will operate.

1. Degrees

The Institute will conduct a Doctor of Philosophy (Ph.D.) programme in the areas of Biology, Chemistry, Computer and Systems Science, Mathematics, Physics, Science Education. It will also conduct an Integrated M.Sc-Ph.D. (I-Ph.D) programme, where both the M.Sc. and Ph.D. degrees will be awarded together on the completion of requirements for both degrees. In some of the above subjects, Master of Science (M.Sc.) programmes will also be conducted.

There will be no separate M.Phil. programme, however M.Phil. may be awarded as an Exit Degree if the

specified requirements are completed by students in the Ph.D. programmes.

The Ph.D. degree will be awarded upon favourable evaluation of a thesis, based on original research, submitted by the candidate. The programme will require a strong foundation and a breadth of understanding in the area of research undertaken. The student will therefore meet appropriate course and other academic requirements, in addition to writing a thesis on the research work. The award of the M.Sc. degree will be based on satisfactory completion of courses, and submission of reports or a thesis as applicable.

The detailed requirements for each degree will be prescribed by the appropriate Subject Board.

2. Subject Boards

Subject Boards will be constituted for each subject in which a degree is offered by the Institute, namely Biology, Chemistry, Computer and Systems Science, Mathematics, Physics, and Science Education. Each Subject Board will have a Convener.

The tasks of the Subject Boards will be:

- to specify the academic background

- required for admission to a degree programme,
- ii. to conduct entrance examinations and interviews for candidates in the relevant subject,
 - iii. to prescribe the course requirements of each programme and to plan the courses offered each year,
 - iv. to prescribe the requirements of a qualifying examination for the Ph.D. degree,
 - v. to carry out the assignment of research programmes or thesis supervisors to students in the given subject, or to suitably delegate the assignment procedures,
 - vi. to conduct all degree examinations, select examiners for the Ph.D. theses and the viva-voce examination, evaluate the reports and recommend granting of the degree,
 - vii. to regularly monitor the progress of students.

Any of the above activities may be coordinated jointly by two or more Subject Boards if desired.

The detailed requirements and procedures for each subject will be put down in a written document called “Subject Guidelines and Procedures”, formulated by each Subject Board. In exceptional cases, the Board may recommend to the Academic Council that some academic background and/or other requirements be waived.

The Departments / Schools / Centres

that constitute the six Subject Boards are as follows, Any additions to these constituents may be made with the approval of the Academic Council.

- Biology: Department of Biological Sciences, Colaba; National Centre of Biological Sciences, Bengaluru; TIFR Centre for Interdisciplinary Sciences, Hyderabad.
- Chemistry: Department of Chemical Sciences, Colaba; TIFR Centre for Interdisciplinary Sciences, Hyderabad.
- Computer and Systems Science: School of Technology and Computer Science, Colaba.
- Mathematics: School of Mathematics, Colaba; Centre for Applicable Mathematica, Bengaluru; International Centre for Theoretical Sciences, Bengaluru.
- Physics: Five Physics Departments in Colaba (Astronomy and Astrophysics, Condensed Matter Physics and Material Science, High Energy Physics, Nuclear and Atomic Physics, and Theoretical Physics); National Centre for Radio Astrophysics, Pune; International Centre for Theoretical Sciences, Bengaluru; TIFR Centre for Interdisciplinary Sciences, Hyderabad.
- Science Education: Homi Bhabha Centre for Science Education, Mumbai.

The Director and Dean, Graduate Studies will constitute the Subject Boards (including the Conveners) every year, with inputs from the Departments,

Schools, and Centres, through the existing Subject Boards. These will be presented in the next Academic Council for information. The Subject Board Conveners may request for a change in the membership any time during the year.

There will be at least one representative on the Subject Board from each of its constituent Department / School / Centre. Some members may also be nominated from other Subject Boards. A Subject Board may appoint small sub-committees of experts, with additional co-opted members, to make recommendations to it on any matter where expert opinion is required.

Centres may have Academic Advisory Committees (AACs), chaired by the Centre Director or Dean, Academic Affairs. The representative(s) of the Centres in the Subject Boards will be ex-officio members of the respective AACs. These AACs will monitor the admission, progress and final evaluation process for all the students of the respective Centres.

3. Administration of Degree Programmes

A Dean of Graduate Studies will be appointed on an annual basis by the Chairperson of the Academic Council. The Dean’s functions will be to oversee procedural and administrative matters concerning the Academic Programme, to coordinate the activities of the various Subject Boards, to facilitate interdisciplinary programmes and to interface with external agencies. The Dean will be a member of the Academic Council.

An administrator of the rank of Assistant Registrar or higher will be entrusted with the work involved in the running of the Academic Programme, and will report to the Dean, Graduate Studies. The Assistant Registrar’s office



Courtesy: TIFR Gallery



Courtesy: TIFR Gallery

will provide administrative support to the Dean and Subject Boards by maintaining academic records, organising admissions, making announcements, processing examinations and theses, and carrying out any such additional work as may be assigned by the Dean GS.

4. Course of Study

The Academic Programmes of the Institute will follow a two-semester system starting around August each year. Typically the first semester will last from August to December, while the second will last from January to May. Additional courses, Visiting Students' Programmes and other such activities may be held in the summer period from May to July. The Subject Boards may decide on their own Academic Calendar every year, depending on their coursework structure of their coursework. This calendar may vary by the Subject Board / campus / Centre.

Every student will be assigned to one of the Subject Boards. Students working in interdisciplinary programmes will have a primary Subject Board,

which will coordinate with other Subject Boards as relevant. A student who wishes to transfer from one programme to another, coming under different Subject Boards, may do so if allowed by the two Subject Boards. In cases of interdisciplinary programmes and transfers, the office of the Dean GS will facilitate coordination among Subject Boards.

Each Subject Board will prescribe the minimum number of Credits to be completed successfully for Ph.D. Registration (for Ph.D. as well as I-Ph.D. programmes), and for the award of M.Sc. and M. Phil. Degrees. Students who have undergone equivalent coursework elsewhere and have transcripts to prove it may be allowed the transfer of credits by the Subject Boards, on a case by case basis. These credits must not have been used for any other degree in the past.

Ph.D. and I-PhD programmes

A student joining the Ph.D. programme will take courses for two or more semesters as prescribed by the relevant Subject Board. The coursework of an I-Ph.D student will be of a longer duration. These courses, together with possible additional requirements such as a comprehensive examination / presentation (depending on the Subject

Board), will constitute the qualifying procedure for advancement to the candidacy for the Ph.D. degree.

M.Sc. programme

Students joining the M.Sc. programme will follow the course requirements laid down by the relevant Subject Boards.

Special provisions for TIFR Scientific Staff

Scientific Staff working for TIFR will be permitted to work for a degree at TIFR provided their thesis supervisor is a TIFR member and they fulfil the same academic requirements as are set down for TIFR students. However in view of the fact that such individuals have other responsibilities, they may be permitted extra time to complete the requirements, at the discretion of the Subject Board.

Each such member will be enrolled on a case to case basis, with the respective Department Chairperson, Dean, or Centre Director making a recommendation to the Dean GS, who will refer it to the relevant Subject Board for their opinion. Upon receiving a recommendation from the Subject Board, the Dean GS will forward it to the Chairman, Academic Council for approval.

5. Ph.D. Registration, Thesis Monitoring Committee, and Fees

Students who qualify the requirements of their Subject Board (including the coursework as well as a qualifying examination if needed) can seek registration for the Ph.D. degree, by filling in a form specifying a provisional thesis title and the name of a thesis supervisor (also referred to as the "thesis advisor", or "guide"). Applications for registration must be approved by the Subject Board. The Ph.D. students must normally complete this procedure within two years of joining the Institute, while the I-Ph.D

students must normally complete it within three years of joining the Institute. A residency period of at least two years after admission will be a requirement for the award of a Ph.D. degree.

Any regular Academic member of the Institute is eligible to be a thesis supervisor. Further eligibility for being a thesis supervisor for the student from a particular Subject Board will be decided by the Subject Board on a case-to-case basis. Upon the superannuation of the thesis supervisor, another academic member of the Institute should become the formal thesis supervisor, however the name of the original thesis supervisor may remain on the thesis as a co-supervisor.

Faculty members from other institutions may be allowed by the Subject Boards to act as co-supervisors, on a case-to-case basis, depending on the topic of the Ph.D. thesis of the student. All such cases should be reported to the Academic Council as information items.

Every student registered for Ph.D. will have a Thesis Monitoring Committee (TMC), with the thesis supervisor as one of its members. The recommendation of this committee will be essential for the yearly extension of the student.

The Ph.D. registration of a student will be normally valid for a period of five years. However it should be re-affirmed every year, either through the yearly extension, or through the report of the TMC before the end of every academic year.

Under exceptional circumstances, the Ph.D. registration may be extended beyond 5 years, or re-activated. However this needs the recommendation of the Subject Board and the approval of the Dean GS. All such extensions will be reported to the Academic Council.

Students in the academic

Courtesy: HBCSE Gallery



programmes may be charged appropriate tuition fees for each semester, as well as registration and examination fees. The fee structure will be laid down by the Academic Council and updated as desired. Scientific staff will be charged fees only from the date of registration. In case the Ph.D. registration needs to be extended or re-activated, re-registration fees need to be paid.

6. Evaluation of Theses

Ph.D. Thesis

The candidate must be registered for the Ph.D. degree. He/she should submit a Synopsis of the thesis, which must have been approved in an open Synopsis Seminar, before the submission of the actual Thesis. The Thesis should be submitted any time after or along with the Synopsis, but before the expiry of six months from the date of submission of the synopsis. (If the thesis is not submitted within six months after submission of the synopsis, a new open Synopsis seminar will need to be given, and the Synopsis will have to be

submitted.) The thesis will be submitted to the Assistant Registrar's office, after obtaining prior approval from the thesis supervisor and the Subject Board.

The Subject Board will choose two external examiners for the thesis, who may be from, but need not be limited to, a list of three to six names suggested by the thesis supervisor. The thesis supervisor will also be an examiner.

The thesis will be forwarded to the examiners by the Assistant Registrar's office, to which each examiner will be asked to send a report. The report should recommend one of the following:

- The thesis be accepted as submitted.
- The thesis be accepted with minor revisions not requiring re-examination.
- The thesis needs major revision and re-submission.
- The thesis be rejected.

The report of the examiners will be considered by the Subject Board, which will announce a Panel of Examiners for the viva voce examination. This panel will include at least one of the external examiners, and the thesis supervisor.



The examination will include an open thesis seminar.

M.Sc. and M.Phil. Theses

These will be handled in the same manner as the Ph.D. Thesis, except the thesis will be sent to only one external examiner for evaluation.

The Panel of Examiners will send a joint evaluation of the viva-voce examination to the Subject Board, who will forward it to the Academic Council, if the award of a degree is to be recommended.

7. Awarding of degrees

The Academic Council will take a formal decision on the award of the degree, based on the recommendation of the Subject Boards and its own evaluation of the examiner reports of the thesis. The final degree certificate will be signed by the Chair, Academic Council (TIFR Director) and the Chair of the TIFR Governing Council.

If the evaluation report of the viva voce examination is positive and the case for awarding of the degree is clear,

the Subject Board may advise the Dean GS to issue a provisional certificate once the candidate submits the final version of the Thesis. In addition, for the I-PhD students, the Subject Board may recommend that the Dean GS gives a provisional M.Sc. certificate once the student has registered for Ph.D. (by completing all the requirements).

The final Ph.D. and M.Phil. degrees will include the title of the thesis, however they will not mention the name of the subject. The final M.Sc. degree will include the name of the subject and a Class that reflects the coursework grades of the student, however it will not include the name of the thesis, if any. The Class will be assigned as follows: “First Class with Distinction” for the CGPA (Cumulative Grade Point Average, on a scale of 100) of 75 and above, “First Class” for the CGPA between 60 and 75, and “Second Class” for the CGPA between 50 and 60. No degree will be awarded if the CGPA is below 50.

Available online at: https://www.tifr.res.in/~gsoffice/Univ_rules_procedures-2019.htm

Subject Guidelines and Procedures: Science Education • 3

(Framed under Article 2 of the Rules of the Deemed University)

The TIFR graduate programme in Science Education follows the basic guidelines and procedures set out in this document prepared by the Science Education Subject Board.

3.1. Degrees, Programmes and Eligibility

Degrees

Ph.D. in Science Education.

Programmes

M.Sc. Programme: Not offered currently.

M.Phil. Programme: Offered as an exit to the PhD Program.

Int. Ph.D. Programme: Not offered currently.

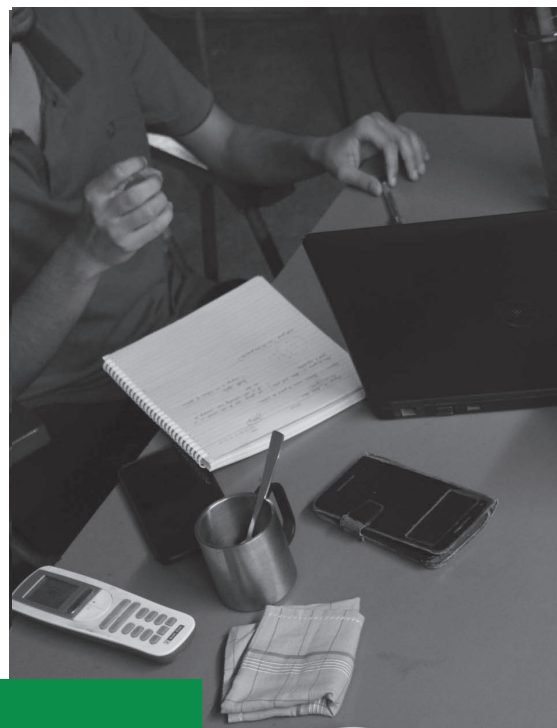
Ph.D. Programme: The graduate programme in the Homi Bhabha Centre for Science Education will lead to a Doctor of Philosophy (Ph.D.) degree in Science Education. As an area for the Ph.D. degree, Science Education is to be

interpreted broadly, including the areas of mathematics education, technology education, environment education and other allied areas.

Eligibility

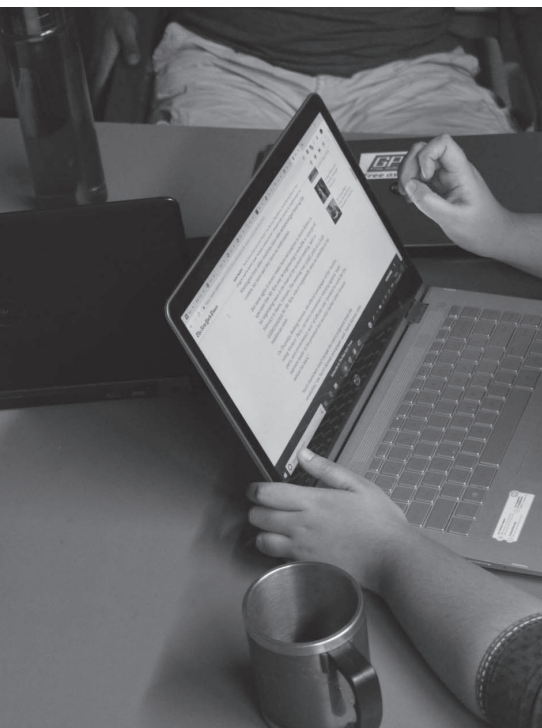
M.Sc. (in any subject), M. Tech or a Master's degree (M.A./ M.S.W.) in any of the social/ behavioural sciences/ psychology/ linguistics/ sociology/ economics/ anthropology or M.Ed with a Science or Social Sciences/Humanities undergraduate degree.

Part-time / External students: Candidates who wish to pursue the Ph.D. program part-time or as external students are allowed to apply. In addition to the above educational requirements, candidates who are employed in either TIFR or other organizations (including teachers) need prior clearance from their respective organizations to be eligible for admission as part-time/ external students.



3.2. Admission Procedure

Ph.D. Programme: There will be a yearly Entrance Examination for admission to the Ph.D. Programme. The eligible applicants will first be screened on the basis of a written test. Candidates who pass the written test will appear for an interview, which is the main part of the examination. In exceptional cases, a special entrance examination may be administered at any time of the year to an especially promising candidate at the discretion of the Subject Board. Provision for foreign students: The above provision for a special entrance examination will also apply to especially promising candidates from abroad.



3.3. Description of the Programme

Ph.D. Programme: Students who enroll in the Ph.D. programme in Science Education will undergo course-work for three semesters. After completing the course-work, they will appear for a qualifying examination. Students are expected to identify a topic and an advisor and register for their Ph.D. degree within six months of passing the qualifying examination. The programme culminates in the submission of the Ph.D. Thesis for a thesis examination. The successful candidates will be awarded the Ph.D. degree of TIFR in Science Education. A residency period of at least two years after joining will be a requirement for submission of the synopsis. A period of at least two years after registration will be a requirement for the award of a Ph.D. degree.

The course-work for the Ph.D. program at HBCSE will consist of two components: (A) Graduate courses and (B) Field work/ Project work. Every Ph.D. student, including part-time/ external students, will need to complete 44 credits obtained through course-work of which a minimum of 24 credits must be obtained through core courses and 8 credits through field work/ project work.

Graduate Courses

The graduate courses at HBCSE will include core courses (methods of educational research; introductory cognitive science) and optional courses on diverse topics such as history, philosophy and sociology of science, language and science, pedagogy and evaluation, etc. There will also be broad-based content courses in science, mathematics and technology. Graduate courses may be lecture-based courses, reading courses or courses in any other

format as decided by the instructor. The courses to be offered will be announced at the beginning of each semester.

Field work/ Project work

HBCSE offers ample opportunities for research students to interact with teachers and students and the social system relevant to the field of research in science, mathematics and environment education. Such opportunities include teacher orientation, student nurture programmes, classroom observation, short research projects, etc. In addition, there are also opportunities at the Centre for project work such as developing experiments, activities and exhibition modules, development of materials in print and other media, etc. All such work done by the student would fall under the category of field work/ project work. It is possible to get funding for field and thesis work. Applications for such funding will be approved on a case by case basis.

Assignment of Research Programmes and Advisors for Ph.D. Thesis

It will be the responsibility of the student to find, in consultation with the Subject Board, a research programme and an advisor, suitable to the student's aptitude and interests. There is no formal procedure for assignment of research programmes and advisors. Students are expected to develop a serious interest in a broad area of specialization by the end of their second year, and they are welcome to consult the members of HBCSE for suggestions about the research to be pursued.

Thesis Guide/ Advisor

All regular academic members of HBCSE with at least two years of post-

doctoral experience are eligible to be thesis advisors. If their superannuation is less than two years beyond the 1st January of the year in which the allocation is made, they should identify at the time of allocation a co-advisor working in a similar area, who can take over as the formal advisor, if and when, the original advisor retires. The co-advisor should have a superannuation date more than 5 years beyond 1st January of that year, and his/her appointment as a co-advisor should be ratified by the Subject Board.

Additionally, each research scholar will be assigned a Thesis Advisory Committee (TAC) comprising of three or more faculty members, once the thesis proposal is defended. The TAC, constituted based on the research scholar's suggestions, will meet every six months. The recommendation of this committee is needed for the student to advance to the next semester. The primary aim of the committee is to monitor the progress of the research student and provide guidance, towards

meeting the guidelines and norms laid down by the Subject Board for Science Education. This process will be based on a report the student submits to the committee before every meeting, and related discussions. The committee may note the strengths and weaknesses of the students, and suggest how they can be best handled to advantage, suggest ways to leverage the opportunities for research in the area, and anticipate the threats to timely completion. The TAC can include members external to HBCSE.

3.4. Course Requirements

- Students must register for core courses, foundational electives and electives.
- Minimum pass grade point (G.P.) for an individual course is 5.0 out of 10.
- Core courses must be completed with a minimum pass grade. If a student gets a G.P. below the minimum grade, he/she must re-register for the course and complete it. No more than two attempts are allowed to pass a core course.

- Exemption from any course may be granted by a course instructor by following the specified procedure for course exemption.
- Must not accumulate more than 8 credits of course work with a G.P. below 5.0 out of 10.
- Must complete 44 credits of course work (including field work) with a minimum cumulative grade point average (CGPA) of 7.0.
- Must complete field work project with a minimum G.P. of 7.0.

Extended period for Part-time/ External students

Part-time and external students admitted to the Ph.D. program in Science Education will need to complete the same number of credits of course-work as the regular students described above. For such students, the course-work must be completed in six semesters or less. Exceptionally, in deserving cases, one extra year may be granted by the Subject Board to enable the student to complete the course



Courtesy: HBCSE Gallery

work. A student who does not complete the course-work by the end of the extended period is liable to have his or her admission to the Ph.D. programme cancelled.

Qualifying Examination

The written comprehensive examination takes place after 2 semesters and is based on the courses completed, a score of 7 out of 10 is required to pass the written comprehensive examination.

The qualifying oral comprehensive examination must be taken not later than six months after completion of the course-work (3 semesters). It will be a comprehensive viva-voce examination conducted by an examination committee constituted by the Subject Board. Part-time and external students admitted to the Ph.D. program in Science Education will also need to appear for the qualifying examination. The qualifying examination will be primarily based on the graduate courses and the field work/ project work that the student has completed and the research area identified for Ph.D./M.Phil.

If a student does not perform satisfactorily in the qualifying examination in the first attempt, he or she will be allowed to appear for a second and final attempt or instead asked to give a seminar or submit a written report. A student who does not pass the qualifying examination is liable to have his or her admission to the Ph.D. programme cancelled.

If a student is found guilty of academic misconduct, e.g. using unfair means in exams, forging academic records, plagiarism etc., strong disciplinary action will be taken, and may lead to expulsion of the student from the Institute.

In meritorious cases, part of the

course-work and qualifying examination requirements may be waived by a decision of the Subject Board in Science Education.

Course exemption

A student may apply for a waiver of a core/ foundational elective course within a fortnight of the beginning of the semester. Such waiver requires a written justification.

A Common Drop Test (CDT), will be held to enable such students to get course waivers for some of the Core/ foundational elective courses in the semesters. If a student secures 7.0 on a scale of 1-10 or above in any paper of the CDT, he/she will be assumed to have completed the course and the marks in that CDT paper will be deemed to have been secured in the course. However, if the student wishes, he/she can continue in the course. If the student decides to continue, his/her CDT result in the corresponding paper will stand automatically cancelled. If a student secures less than 7.0 in any paper of the CDT, he/she will need to continue in the course.

Students with recognized teacher qualification can be exempted from crediting the teaching experience course.

Course credit calculation

- 4 hours a week for a 4 credit course, which runs for a minimum of 14 weeks.
- 4 credits for teaching experience course.
- 8 credits for field work project.
- Total of 44 credits.

Registration

Students who pass the qualifying exam and successfully defend the thesis

proposal can seek registration for Ph.D. For this, they will need to apply to the subject board within 6 months of the qualifying examination / defense of the thesis proposal and seek approval of the Subject Board for registration. The application should contain the name of the proposed thesis advisor and a broad description of the topic of research intended to be pursued, endorsed by the proposed thesis advisor.

Milestones

Extension from 0.5 to 1 year

The academic programme of a student will be terminated if at the end of a semester

He/She has received less than 5.0 in 2 or more core courses OR

He/She has received less than 5.0 in 2 courses and CGPA is less than 7.0.

Extension from 1 to 1.5 years

Student should have completed written comprehensive exam. The academic programme of a student will be terminated if at the end of the second semester

He/She has received less than 5.0 in 2 or more core courses OR

He/She has received less than 5.0 in 2 courses and CGPA is less than 7.0.

Extension from 1.5 to 2 years

He/She should have completed 36 credits of course work. He/She should have completed 24 credits through core courses. He/She should have got a grade point of at least 5.0 in each core course He/She would need to have a CGPA of 7.

Extension from 2 to 2.5 years

Student should have completed 44 credits. He/She would need to have a CGPA of 7. Student should have completed 24 credits through core courses.

Student should have got a grade point

of at least 5.0 in each core course.

Student should have completed field work with a G.P. of at least 7.0.

Student should have completed oral comprehensive exam and defended thesis proposal in a proposal seminar. In exceptional cases, a student may be given an extension of one semester to meet this requirement.

Extension from 2.5 to 3 years

Student should have registered for PhD.

Extension from 3 to 4 years

Satisfactory progress report from guide and TAC.

Extension from 4 to 5 years

Submission of a manuscript article to a well recognised peer reviewed research journal. Satisfactory progress report from guide and TAC.

Any extension beyond 5 years will be a special case.

Termination

If a student fails to get an extension, the scholarship will be terminated.

Publication requirement

All research scholars are required to publish at least one research article, based on their doctoral work, in well recognised and credible peer-reviewed journals. Research scholars are expected to make this submission as early as possible, preferably by the end of their fourth year.

Submission of synopsis

The Synopsis of the thesis can be submitted only after acceptance of a research article based on doctoral work, in a well recognised peer reviewed research journals.

Approval of Submission of Ph.D.

synopsis and Ph.D. Thesis

After a student completes his/ her Ph.D. research project, the student will forward a synopsis of the thesis to the Subject Board (with the permission of the Thesis Advisor) to obtain prior approval for the thesis submission to the Deemed University Office. The same procedure will once again be followed to obtain prior approval for submission of the corresponding thesis. The Subject Board will in general give its decisions in about a week. Once the Subject Board approves the submission of a synopsis/ thesis, the rest of the process of submission and evaluation of the synopsis/ thesis will follow the general guidelines prescribed by the Academic Council, as given in the document "Deemed University: Rules and Procedures".

Exit with M.Phil. Degree

Students in the Ph.D. programme are normally awarded the PhD degree at the end of their academic tenure in TIFR. However, a student in the Ph.D. programme, who, at the end of his/her second year, is unable to continue in the Ph.D programme for any reason, is permitted the option of leaving TIFR with an M.Phil. degree in Science Education. This option may also be permitted on a case-to-case basis for students at a later stage provided the student completes a minimum residence requirement of 3 years for award of the M.Phil. degree.

The rules governing this exit option are as follows:

- This option is open to all PhD students.
- The student must give a written application in a specified format at the end of his/her 4th semester or at a later stage that he/she wishes to avail of the exit option with M.Phil. The student's eligibility for the

M.Phil. degree is not guaranteed, but will be assessed on a case-by-case basis.

- Once this application is approved, the student cannot revert back to the PhD programme.
- All the course work requirements for a normal PhD programme as applicable to the student must be satisfied.
- After the student's application for availing of the M.Phil. option is accepted, the student shall submit a M.Phil dissertation proposal within one month from the date of application and register for a M.Phil. thesis, which shall be in addition to his/her departmental projects. At the close of one year, following the registration the student must submit an M.Phil. thesis, which will be



evaluated in the same way as a PhD thesis, except that only one external (to TIFR) examiner is required.

- Post-declaration, the student will be provided accommodation by TIFR, but the Fellowship and Contingency Grant will revert to the levels of the 1st year, viz. Fellowship of Rs. 31,000/- p.m. and Contingency Grant of Rs. 40,000/- p.a.
- No extension of Fellowship or Contingency Grant beyond one year after the date of declaration will be granted.

Visiting Students' Research Programmes

Not offered currently.

3.5. Graduate Course Structure

Core courses: $12 + 8 + 4 = 24$
Foundational Elective / Elective courses: 12
Field work credits: 8
Total: 44

Percentages:
Core – 55 %; Foundational Elective/ Elective – 27%; Field work – 18%

Elective courses (partial list):
Advanced philosophy of science,
Introduction to STS, Language and science, Philosophy of technology,
Advanced cognitive science, Science communication, Mathematics education research, Science education research, Physics Education research, Chemistry Education research.

Some modular courses, with a narrow focus, would also be offered., These could be audited or credited. TISS and IITB have programs in areas overlapping with our graduate program. Courses at these institutions can be taught or taken jointly by HBCSE students.



Semester	Course Type	Course Title	Cred-its	Credits in a semester	Requirement for extension beyond the period
SEM 1	Core	History of Science	2	14 Core Course Credits + 4 Foundational course credits	Should not have GP less than 5.0 in 2 or more core courses. Should not have GP less than 5.0 in 2 courses and CGPA is less than 7.0.
	Core	Cognition,Cognitive Development & Learning	4		
	Core	Introduction to Science &Mathematics Education Research	4		
	Core	Teaching Practice and School internship / Design of Learning Resource	4		
	Foundatonal Elective Course	Philosophy of Education	4		
SEM 2	Core	Philosophy of Science	2	10 Core course credits + 4 foundational course credits + 2/4 elective course credits	Successfully completed Written Comprehensive Examination. Should not have GP less than 5.0 in 2 courses and CGPA is less than 7.0.
	Core	Methods of Science & Mathematics Education Research	4		
	Core	Teaching Practice and School internship / Design of Learning Resource	4		
	Foundatonal Elective Course	Education, Society & Education Policy in India	4		
	Elective Course	Elective Course (Optional)	2/4		
SEM 3	Core	Advanced Research Methods	4	4 Core Course Credits + 4 Foundational course credits	Completed 36 credits, out of which 24 credits are through core courses. GP at least 5.0 in each core course and CGPA at least 7.0
	Elective Course	Elective Course (Optional)	2/4		
SEM 4	Field Work Oral Comprehensive Examination	Field Work (may begin in 2nd or 3rd semester but must be completed before the end of 4th semester)	8	8 Field work credits	Completed 44 credits and out of which 24 credits completed through core courses. G.P. ≥ 5.0 in each core course, field work G.P. and CGPA ≥ 7.0 Completed Oral Comprehensive Examination
End of 2nd Year	Thesis Proposal	Successfully defends the thesis proposal in a seminar and registers for PhD			
End of 4th Year	Submission of an article	A manuscript article is submitted to a well recognised peer-reviewed research journal and is based on the work towards PhD dissertation			
Research paper acceptance, synopsis submission (open seminar), thesis submission and thesis defence					



4 • TIFR Guidelines on Academic Ethics

1. Preamble

The Tata Institute of Fundamental Research (TIFR) expects all its members to follow the highest standards of academic ethics. The present document outlines these standards and how they are to be followed, in the form of guidelines.

While all of us are required to follow ethical norms originating from the values that inform the Constitution of India, the special nature of academic activities places special responsibilities upon us at TIFR. These take the form of moral obligations towards our fellow members, the Institute, the public at large, academicians all over the world, and our own academic disciplines. Academic members of TIFR pursue diverse activities including the conduct of research, publication of articles, training and mentoring, administration of science and interfacing with the public and press. In all these contexts, the best scientific atmosphere requires awareness, sensitivity and careful adherence to ethical norms.

This document prescribes various types of necessary and desirable academic practices, and also highlights several types of practice that are not acceptable. It sets down procedures to investigate alleged cases of ethical misconduct and remedial actions to be taken by the authorities whenever such misconduct may have occurred. This document is not exhaustive and could undergo revisions in the future. This document has drawn upon the document “Scientific Values: Ethical Guidelines and Procedures” of the Indian Academy of Sciences, with their kind permission.

2. Conduct of Research

2.1. Responsibilities of a research investigator

Research at the Institute is conducted either individually, or within informal collaborations, or in organized groups conducting research on specific projects. In a wide variety of research projects, some combination of faculty members, postdoctoral researchers, laboratory staff,

students and/or external collaborators may be involved. All individuals participating in a given project are responsible for their own actions and should make sure these are consistent with, and uphold, high ethical standards.

In experimental research projects there is usually a Principal Investigator (PI) or a set of co-PI's who lead the project. The PI's are also expected to play a leading role in ensuring ethical standards. He or she should closely and regularly monitor the experimental procedures used and formulate policies for recording data and compiling results in the form of publications and reports. It is advisable to formulate norms in this regard which should be made known to all the participants in the research project. The PI should also ensure careful supervision and appropriate mentoring of young researchers including students and postdoctoral fellows. In the case of informal collaborations, more common in theoretical disciplines, there may not be a designated PI but all members involved are expected to play an appropriate role to ensure that ethical standards are upheld.

2.2 Responsibilities of a student

In addition to their ethical responsibilities as researchers, graduate students at TIFR are required to adhere to the highest ethical standards in their conduct during courses, assignments and examinations and in their behaviour towards other members of the research community.

2.3 Data management

In both independent and collaborative research, every effort must be made to ensure that data are collected and computations performed with complete honesty. False statements and/or deliberate distortions are unacceptable. Fabrication, falsification or improper manipulation of data are highly unethical and must not be resorted to for any reason. Investigators in any given field should familiarize themselves with the methods of handling and processing data that are considered acceptable/unacceptable in their field. The procedures for recording and storing data will also vary from subject to subject, but in each case they should be well formulated in advance and scrupulously followed. Researchers should be aware that it is not uncommon for the correctness of a research publication to be questioned, even after publication. Particularly with experimental work, defending the publication requires properly recorded raw data to be produced and its absence or premature destruction could be treated as suspicious. A well maintained lab notebook provides not only a permanent record of results and protocols for future publications, but also serves as critical evidence for a

claim of priority in the case of patent applications and as proof of adherence to appropriate ethical standards. Tampering with or manipulating records in a laboratory notebook is considered to be fraudulent activity. It is recommended that research related data, lab notebooks and material be stored in a secure manner so that if required the scientific validity of the data can be examined. Generating, recording and publishing false data are fraudulent practices that must be scrupulously avoided.

2.4 Ownership

Physical materials including lab notebooks, data sets etc arising out of research performed at TIFR, will remain the property of TIFR unless explicitly decided otherwise. The same holds for software and processes having commercial value.

2.5 Responsible use of funds

The management of research funds requires adherence to TIFR financial policies and regulations. This is applicable to both funds received from TIFR and from external granting agencies. Efforts should be made to ensure reasonable and efficient use of resources following transparent and fair processes.

2.6 Sharing of facilities

Equipment installed at TIFR is expected to be shared in a collegial spirit with colleagues who have the background to operate the equipment and require access for their own research, as long as such access does not impede the original purpose for which the equipment was purchased. Wherever time-sharing is appropriate, transparent procedures for this should be put in place.

2.7 Experiments involving human beings or animals

All experiments that involve use of animal and human research subjects require ethical permission and approval. Experiments involving animals come under the purview of the TIFR Institutional Animal Ethics Committee (IAEC) which functions based on the guidelines of CPSEA (Committee for the Protection, Care and Supervision of Experimental Animals). Experiments involving human subjects come under the purview of the TIFR Institutional Human Ethics Committee (IHEC) which functions based on the guideline of ICMR (Indian Council of Medical Research).

2.8 Safety and environment

It is the moral responsibility of a scientist that his/her research activity should not endanger others by compromising their safety or health or by creating environmental hazards. TIFR expects all its members to incorporate safety and environmental concerns into research practices. In this regard it is important that applicable environmental guidelines, regulations and laws are followed, and that appropriate licenses/ permits and clearances are obtained for the handling, storage or disposal of hazardous material. In particular within experimental laboratories the PI's should take responsibility for ensuring that the work area is safe, and that research practices of the group do not endanger the research team, visitors or the public. In this regard the PI's are expected to encourage team members to undergo appropriate training to maintain safety and environmental standards.

3. Training

3.1 Student recruitment, assessment and allotment

Recruitment of students to TIFR should involve a fair and transparent procedure. While assessing merit during a selection can involve some subjective features, particularly during interviews, care must be taken to ensure that extraneous considerations – namely, any attribute of the student that has no bearing on academic ability or potential – are rigorously avoided. Assessment of the performance of students, made through examinations and by course or thesis guides, must also be carried out with maximum objectivity. The assessment procedure for a course or project should be made clear to the student from the beginning. The same holds when students are allocated to research programmes, for which purpose a fair and transparent procedure should be put in place and made known to all candidates.

3.2 Research supervision

It is self-evident that during the course of their research activity, students tend to absorb and internalize the ethical atmosphere within their group. For this reason among others, research supervisors should display the highest ethical standards when dealing with students. Conflicts between students and others in their group, or between students and guides, are not uncommon in academia. Supervisors should be aware of the potential for this type of problem. Potentially troublesome issues should be identified and dealt with as soon as possible, ideally before they graduate into full-

blown conflicts. Claims and counter-claims about relative contributions are a particularly problematic area which supervisors need to handle with manifest fairness and clarity. It is recommended that graduate students meet regularly with their doctoral thesis committee, whose role is to monitor the progress of the student's thesis work, to ensure the student and thesis advisor work efficiently to meet graduate school related deadlines, and to mediate resolution of disputes should they arise.

3.3 Ethics in teaching

TIFR members involved in teaching and training of graduate students should treat the intellectual development of students as their highest priority. They should strive to ensure the highest quality in their course content, competence in teaching methodology and fairness in assessment of assignments and examinations. They are also expected to maintain confidentiality of student records and communications, and maintain dignity in the classroom environment.

3.4 Ethical training to students

Students at TIFR should receive direct ethical training, preferably on a regular basis. A mandatory ethics module should be provided at the time of joining as part of the orientation. Additionally course-specific and laboratory-specific ethical training should be imparted at the appropriate times.

4. Publications

4.1 Authorship

The authorship of scientific publications is a very important issue since it is the way in which scientists receive credit for their contributions.

All listed authors of a publication should have contributed significantly to it. It is inappropriate to offer “guest authorship” to anyone who has not made any significant contribution. Likewise, it is wrong to exclude from authorship anyone who deserves to be an author. It is unethical to include anyone as an author of a paper without their clear consent. The order of authorship can also be important. It is not possible in this document to list precisely what constitutes a significant contribution to a publication, or what is an appropriate authorship order. This is because community standards vary widely from subject to subject. Researchers should familiarize themselves with the standards in their field and, importantly, the criteria laid down by the journal to which their work is submitted. Deliberate failure to follow these criteria would be treated as ethical misconduct, not only towards the journal but also towards TIFR.

4.2 Plagiarism

The Oxford Dictionary defines plagiarism as “the practice of taking someone else's work or ideas and passing them off as one's own”. In the context of scientific research, it can involve unattributed lifting of textual material or scientific ideas or actual research results. The most extreme example would be a deliberate attempt to pass off someone else's entire research project as one's own. However, it can also involve (deliberate or unintentional) incorporation of some ideas or results of other researchers, without proper attribution, within one's own research publication. Though the degree of severity can vary, plagiarism always amounts to ethical misconduct and requires redressal.

The use of someone else's work in one's own is not by itself unethical. A

limited amount of textual material in someone else's paper can be copied if it is clearly marked as a quote (typically by enclosing it within quotation marks) and the source is explicitly cited where the quote starts or ends. Alternatively, text may be paraphrased with a general indication of where the concepts originated. Occasional re-ordering or substituting of words is not sufficient to count as paraphrasing: the recommended procedure is to read and understand the source material, then put it away and express the idea in one's own words. Besides textual material, the incorporation of ideas, figures, graphs etc from other sources in a manner that conveys a false impression that they are original amounts to plagiarism. Taking one's own published results and reproducing them in another work as if they were new is "self-plagiarism". "Duplicate publication" – submitting the same research results to two or more journals and treating them as separate publications – is also a form of self-plagiarism and must be avoided. Plagiarism is an issue not only for scientific publications but also internal reports, textbooks, monographs and grant proposals. The considerations above apply equally in all these cases.

4.3 Thesis writing

A thesis typically involves collecting a large amount of material, both previously established and original. The manner of presentation must be such as to make clear what has been taken from other sources with appropriate acknowledgement and permissions if required, and what is the original content. For a student, thesis writing is often the first major occasion that requires taking personal responsibility to handle ethical issues. Guidance must be imparted to make sure that data is presented appropriately and plagiarism, even inadvertent, is avoided.

4.4 Responsibility of referees

Scientists who are asked to review a manuscript or a research proposal have a responsibility to ensure they do not misuse their advance access to the information and ideas in these documents. The use of such advance access to publish a competing work, or carry out research that preempts the proposed project, would be highly unethical.

5. Confidentiality

Several aspects of academia require the maintaining of strict confidentiality. The proceedings and Minutes of certain meetings, as also assessments for hiring and promotion, are not to be discussed publicly. It is particularly important for the health of the Institute that candidates about whom positive or negative comments are made in meetings by specific members should not learn about these comments. Such leaks could compromise the ability of Institute members to give honest assessments. They can create resentment, or conversely an inappropriate sense of obligation, on the part of a candidate. Unauthorised email circulation of confidential Minutes or

other privileged communications, within or outside the Institute, amounts to a serious breach of academic ethics. For this purpose it is best to consider all official emails and communications to be confidential unless it has been expressly clarified to the contrary.

6. Science management

6.1 Evaluations: hiring, promotion, awards

In a research institute, assessment of candidates for hiring, promotion and awards is a regular activity. While this necessarily involves some degree of subjective judgement, it is essential that an assessor take great care to eliminate personal biases and extraneous considerations and proceed in a manner that is visibly fair and balanced. The general criteria for hiring, assessment and awards should, as far as possible, be laid down in advance. It is inappropriate to introduce new criteria, not previously agreed upon, during an assessment process purely for the purpose of favouring or disqualifying specific candidates. When referee evaluations are used, they should be sought in writing.



6.2 Technology and materials transfer

Research conducted at TIFR is based on the principle of the free dissemination of scientific knowledge, and this also applies to research at TIFR funded by industry. TIFR subscribes to the principle that inventions and discoveries emerging from publicly funded research should be made available for public benefit through appropriate technology transfer. Whenever inventions are patented or technology emerging from TIFR research is licensed for commercial use, care must be taken that the principle of free dissemination of scientific knowledge remains paramount. Patentable inventions based on work done at TIFR are to be assigned to TIFR. When conducting research activities supported by external granting agencies or jointly with other research institutions, TIFR members must consider entering into clear agreements (formal or informal but explicit) which cover the nature of the collaboration, materials and technology transfer (whenever relevant), authorship of resulting publications and ownership of patentable inventions. These agreements must be consistent with the principles enunciated above. Memorandums of Understanding (MOU's) are essential for industry-funded research. They should clearly state the manner of sharing of proprietary data, time lines to avoid delay of publications and procedures to be followed for patentable data. Potentially patentable inventions that arise from industry-funded research carried out at TIFR are to be subject to stipulations of the MOU between the industry and TIFR, set in place prior to the commencement of the research.

6.3 Bias and discrimination

The TIFR academic community is enriched by the presence of people of different ethnicities, genders, ages, affiliations, backgrounds and sexual orientations. It is incumbent on the members to so conduct their academic

affairs that there is no direct or indirect bias or discrimination against any individual based on the above categories. TIFR aims for the full and equal participation of women in all academic activities. It is everyone's responsibility to foster a gender-neutral and supportive environment to achieve this goal.

6.4 Bullying and harassment

In academia it is essential to promote an atmosphere of free and frank debate and exchange of ideas. In this context, any form of bullying or harassment by individuals or pressure groups is not acceptable.

6.5 Interaction with public and media

Statements made to the media should be as objective, fair and balanced as possible. The same holds for scientific information conveyed to the public. Scientists are expected not to use the media to promote their own personal image or create a false or exaggerated impression of their achievements.

7. Conflict of interest

Several types of situations can arise in academia where a person experiences a conflict of interest. Reviewers of manuscripts may find that the contents of the manuscript have a potential impact on their own research or financial interests. Assessors for a hiring/promotion/award may be personally related to a candidate. Researchers who are also shareholders of a company may find themselves in a situation where their research could impact the company's financial situation. In all such cases it is essential for researchers to promptly disclose foreseeable conflicts of interest. It is not sufficient for the researcher to consciously decide to handle the matter objectively. The decision on whether the conflict of interest requires definite action (such as the researcher

withdrawing from a committee) should be taken by other responsible colleagues. Foreseeable research conflicts should be reported to the Director TIFR and potential conflicts while reviewing manuscripts should be reported to the journal editor. In case an assessor has a personal relation to a candidate in an interview, this fact should be communicated to the committee Chair (or if the assessor in question is the Committee chair, then to the appointing authority of that Committee).

8. Reporting of misconduct

Suspected ethical misconduct at TIFR must be reported to the Director. There will be no reprisal for complaints made in all sincerity and good faith, even if they later turn out to be unfounded. However, complaints that turn out upon investigation to have been falsely made with deliberate intent to malign the accused will be treated as a serious form of ethical misconduct. Complaints can be made by anyone, not necessarily an Institute member. They must be signed and carry the full name and address of the complainant. Some relevant documentation must be supplied along with the complaint in order for the Director to be able to decide whether there is a prima facie case. The complainant should not give wide publicity to the complaint at

this stage. Such publicity, if it occurs, can be treated as ethical misconduct even if the complaint is found to have merit and continues to be investigated.

9. Mechanism to address complaints

The Director will appoint a standing Committee on Academic Ethics for a pre-determined duration whose task is to investigate ethical complaints and also impart ethical training from time to time. The Director may also consult a broad-based Advisory Committee on ethical issues that involves Deans, Centre Directors and other faculty members.

9.1 Course of action

Upon receiving an ethics complaint, the Director TIFR should decide whether there is prima facie merit in the allegations. Finding such merit does not imply that the complaint has been upheld but only that it has not been found obviously invalid or frivolous. To decide this, the Director may consult the Ethics Committee. At this stage, if appropriate the Director may, in consultation with the Ethics Committee, explore the possibility of an amicable solution through mediation. If this is successful the complainant will modify or withdraw the complaint in writing. However, the complainant should not be coerced to accept mediation. If the Director is satisfied that the complaint merits investigation it should be passed on in full, including supporting documents, to the Ethics Committee. Simultaneously the Director should communicate it to the subjects of the complaint, informing them that an investigation will take place with which they are required to cooperate fully. Their response to the complaint should be invited and passed on to the Ethics Committee. The Director should also inform the complainant

that the complaint has been referred to a Committee for investigation. During the investigation period, both the complainant and the subjects of the complaint may submit information or documents to the Director, who shall forward these (if relevant) to the Ethics Committee. During this period they should not communicate with the Committee except when invited to do so, and should also minimise their communications with the Director on this matter.

The Ethics Committee should investigate the complaint carefully and with due discretion. During this period it should try to hold a face-to-face meeting with both the complainant and the subjects of the complaint if possible. At the end of its investigations it will submit a written report to the Director TIFR indicating the extent to which merit has, or has not, been found in the complaint, and suggesting remedial action if any is required. The Committee must not publicise the report at this stage. On receiving the report, the Director should communicate it in full both to the complainant and to the subjects of the complaint and invite their response. Thereafter the Director may decide to accept the report in full and implement it, or accept it partially, or reject it totally. This decision should be communicated to the Ethics Committee. The final verdict on the case, including any redressal required, will take the form of a written statement by the Director communicated to the complainant, the subjects of the complaint and the Ethics Committee. The Ethics Committee report may be attached to this statement in full or part, if relevant.

9.2 Time frame

The investigation of an ethics complaint cannot easily be assigned a time-frame. However for relatively

simple cases it is desirable that the first report be submitted within 3-4 months. More complex cases, particularly those requiring detailed investigation of scientific issues, can take as long as six months to a year or even more.

9.3 Interference with the investigation

Any attempt to interfere with the functioning of the Ethics Committee in any manner, or refusal to cooperate with the investigation, constitutes an ethical violation by itself. This should be reported by the Committee to the Director for appropriate action.

9.4 Availability of results of ethics investigations to TIFR members

Members of TIFR are entitled to request the Director for access to the final report of the Ethics Committee, and the Director's written statement to the concerned parties, upon completion of the investigation.

June 4, 2012. Available on:

<http://www.tifr.res.in/webdocs/TIFR-doc-ETHICS.pdf>

Please note that in HBCSE, the Subject Board will also serve as the Ethics Committee.





5 Facilities and institutional support for Research Scholars

Pursuing a research project systematically for five years requires focus, and significant support to maintain this focus. HBCSE provides research scholars a range of facilities and institution-level support to complete their Ph.D. projects. These are outlined below, along with the administrative rules and guidelines related to accessing these facilities and support systems.

5.1 Scholarship and Contingency Grant

All eligible research scholars receive a scholarship of Rs. 31,000 per month till registration, and Rs. 35,000 per month post-registration. This funding is available for 5 years, subject to satisfactory performance, as judged by the TAC every six months post-registration. Research scholars also receive HRA (as per rate prescribed by the institute) in lieu of on-campus institute accommodation. Please see section 3.4 (milestones subsection) for rules regarding satisfactory performance.

Further, a contingency grant (Rs.

40,000 per year, non-cumulative) is also available for 5 years. This grant needs to be accessed during every academic year (between August 1 and 31st July). This account is maintained by the Dean's Office.

Contingency Education Grant Rules:

The contingency grant amount is non-cumulative, i.e. it will not be carried over to the next year, and needs to be claimed every year. The items covered by the grant are:

- Books, journals, cost of photocopying of documents.
- Payment of fellowships/ memberships of professional organizations/ societies.
- Travel to conferences, workshop and other educational trips.
- Purchase of Laptops, Notebook, Tablet PCs, e-Book Reader etc.
- Purchase of computer software peripherals, accessories and software.
- Internet bill for students living outside the campus.

Please note that mobile phones are not allowed under contingency. If the cost of a particular item is more than the available amount of the contingency grant, the extra amount may be claimed from the next year's contingency grant, once the student becomes eligible for it.

The contingency grant may be carried over to the next year only for a known large expenditure in the following year, like a conference that the student plans to attend. The carry-over will be only for this specific purpose, and the permission for this has to be obtained from the Dean's Office before the academic year ends.

The contingency grant for an academic year may be claimed at any time during the year. However, if the student leaves HBCSE before the completion of the year, the amount of grant the student is eligible for will be calculated (proportional to the fraction of the year spent in the centre) and the extra amount will be recovered.

Please Note

Books purchased under contingency



will have to be brought to the Dean's Office for stamping, when submitting the claim.

For society subscriptions, a copy of the receipt needs to be enclosed (countersigned by a Reader or above from the same group).

For travel reimbursement (schools, conferences and workshop) a copy of the letter of invitation, Copy of deputation leave granted, a statement from the organizers certifying attendance and that they did not pay for travel, as well as copies of tickets/Boarding Pass etc. (all countersigned by a Reader or above from the same group) will need to be submitted.

A valid invoice in the name of the student claiming contingency (with invoice number, GST no. etc., and not simply a Delivery Challan or Proforma Invoice) has to be produced for claiming contingency.

Foreign currency cash memos need to be converted into Indian currency (this will be done by the Accounts section).

Purchased items along with cash memos and "Contingency Claim Form", duly approved and signed by the Course/Project/Ph.D. Guide and countersigned

by a Reader or above from the same group of the Research Scholar should be submitted to the Dean's Office, to complete the administrative formalities.

Available online at:

http://www.tifr.res.in/~gsoffice/contingency_grant.htm

5.2. Participation in national and international conferences

Research scholars are encouraged to submit papers based on their work to national and international conferences. On acceptance of their paper, they can get funding for travel and conference registration, through the Knowledge Exchange Scheme. Research scholars can be granted a maximum of 1.5 lakhs during their entire tenure period. The amount that can be availed in any single financial year cannot exceed 1.0 lakh. The eligibility for funds, in the current and subsequent years, will be calculated with retrospective effect, on the basis of funds availed by the research scholar from the date of joining.

To avail these funds, an application needs to be made to the Dean, supported by recommendations from guides or reporting authority. Subject to fulfilling certain criteria, the participation in the conference can be sponsored by the centre. Research scholars may also apply to external organizations who provide travel grants and scholarships for participating in conferences.

5.3 Leave facilities

Research Scholars are eligible for the following leave each year.

Casual Leave – 8 days

Special Leave – 2 days

Deputation Leave - 30 days (1 January to 31 December)

Vacation Leave – 70 days (1 July to 30 June of the following year)

Vacation Periods

16 December to 14 January

1 April to 31 July

1 October to 31 October

Earned Leave – Vacation Leave converts to Earned Leave @ 2.33 days

1 day of Earned Leave = 2.33 days of Vacation Leave

Female Research Scholars will be eligible for Maternity Leave (180 days) and an additional 60 days of Child Care Leave under special circumstances. However, they will not be eligible for reimbursement of medical expenses incurred during pregnancy and post confinement.

5.4 Medical Facilities

A memorandum of agreement has been signed with Joy Hospital, Chembur, Mumbai for providing cashless hospitalization treatment for research scholars. Many research scholars have availed this facility.

In case of a medical emergency during office hours, research scholars can go to Joy hospital, taking an authorization letter from one of the following authorized signatories:

Prof. K. Subramaniam
Prof. Sugra Chunawala
Shri V. P. Raul

Research scholars will need to carry their valid HBCSE identity card for admission in Zen Hospital.

Please note:

1. In an emergency situation after office hours or during holidays, research scholars may get admitted to Joy Hospital on the basis of his /

her valid HBCSE identity card and a telephonic approval by one of the above mentioned authorized signatories. The authorization letter is to be submitted to Joy Hospital on the next working day.

2. Zen Hospital will not ask for any security deposit at the time of admission.
3. Research scholars are entitled for AC (multi-sharing ward with food) at the rate of Rs. 1200/- per day, or economy deluxe (AC double with food) at the rate of Rs. 1500/- per day.
4. In case a bed is not available in the hospital in the class entitled to the research scholar, the patient will be admitted in one of the other classes and the change in class will be intimated to HBCSE by Joy Hospital.
5. At the time of discharge, the patient is not required to pay any hospitalization fees. The patient will be required to sign on the reverse of the bill at the time of discharge.
6. The hospital will keep the patient only for the required number of days of treatment, and carry out only the

required investigation and treatment, for the ailment for which he or she is admitted. Any other incidental investigation required by the patient for his or her benefit are not payable under the scheme, and the research scholar will have to bear the cost of the same.

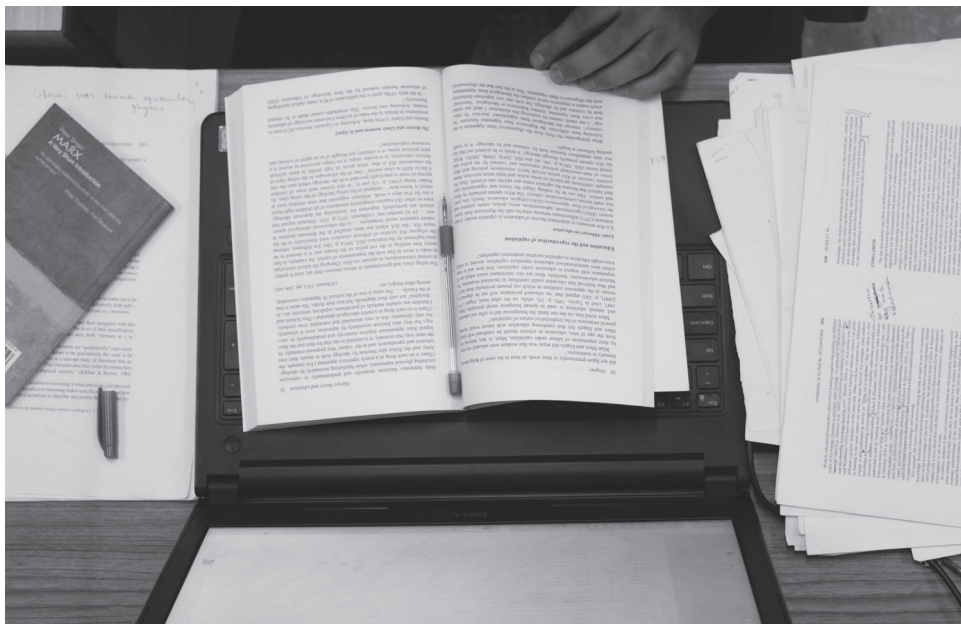
7. Research scholars can avail out-patient treatment in the casualty section of Joy Hospital. The charges are Rs. 100/- during day time and Rs. 150/- at late hours in the night. Research scholars will have to make the payment for the out-patient treatment as well as for the medicines prescribed for the ailment. The bills may be presented to HBCSE for reimbursement. The prescription for out-patient consultation should only include medicines for the ailment. In case tonic, vitamins or toiletry items are procured, the expenses will not be reimbursable.
8. In case research scholars avail out-patient treatment from any other doctor, the ceiling for reimbursement will be the same as mentioned above in point no. 7.

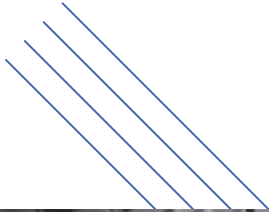
In case there are difficulties in getting admission to Joy Hospital, the following staff members of Zen Hospital can be contacted:

Mr. Avinash Khopkar- 9892595074
Mr. Anil Naik – 9892529972

Zen Multi Speciality Hospital, Plot No 425, 10th Road Near Sandu Garden, Chembur Gaothan, Chembur, Mumbai, Maharashtra 400071

Tel : +(91)-(22)-022 2526 0066/ 0077
Email: jinfo@zenhospital.in
Available online at: <http://intranet.hbcse.tifr.res.in/local-facilities/medical-facilities-for-research-scholars/view>





Courtesy: HBCSE Gallery



Courtesy: HBCSE Gallery



Glimpses from the graduate student life



Courtesy: Deborah Dutta



Courtesy: HBCSE Gallery

Courtesy: HBCSE Gallery



Courtesy: Himangshu Srivastava



5.5 Hostel Facilities

All research scholars are provided on campus accommodation. The Hostel facility comprises of the Old Hostel building and the NIUS (B Block) Hostel building.

The following Terms and Conditions are applicable for the use and occupation of HBCSE Hostel.

1. Allotments

Research scholars can apply for hostel accommodation by writing a letter addressed to the Dean's Office. The allotments will normally be for a year. The term will be renewed on receipt of information that the term of the research scholar is extended. In exceptional cases, allotments may be extended with the approval of the Centre Director. The allotment may be terminated by giving one month's notice, without assigning any reason.

Every allottee must take charge of the room within 3 days from the date of receipt of the allotment order, or 3 days from the date on which the room has been made ready for possession, whichever is later, failing which the allotment order is liable to be cancelled. Based on a written request, the Hostel In-charge/Centre Director may waive this time limit in writing.

2. Occupation & Use

The following terms and conditions govern the occupation and use of the hostel rooms/flatlets:

1. The allottee shall take possession of the room after checking and discharging a receipt for all the furniture and fixtures therein.
2. No occupant will use any locks on the external door of the room, other than those provided by the Hostel authorities.
3. The maintenance/cleaning staff will

have access to the hostel rooms for maintenance/cleaning purposes. The maintenance/cleaning will be done with the permission of the resident of each room, and the schedule for this will be decided by the Hostel authorities, in consultation with the residents.

4. Every resident shall be responsible for all the furniture and fixtures in the room, and shall make good any loss or damage to the furniture or the fixtures or the room.

5. The resident shall not put up any additional fixtures or bring any heavy furniture, except radio receivers or similar gadgets. They shall not drive nails etc on the walls or carry out alterations to the existing furniture and fixtures, without the written permission of the Hostel In-charge.

6. Notwithstanding the permission to put up a fixture, it will not be allowed to be removed if such a removal is likely to render damage to the room.

7. A resident may have up to 2 guests at a time for a period of not more than 15 days. Not more than two guests will be accommodated in the room. In case the resident keeps the guests in his / her room only one guest can be accommodated in the resident's room. For guests living in the residents' room Rs. 100/- per day will be charged for linen. Accommodation for residents' guests will be subject to availability.

8. A guest will not be allowed to stay for more than 15 days even if continuation is sponsored by another resident. Extension of stay may be allowed under special circumstances as decided by the Hostel In-charge and the Centre Director.

9. Residents are expected to follow proper etiquette and use the facility with discretion, so that they cause no inconvenience to fellow residents and no damage to property.

10. Accommodation may be provided



to married research scholars depending on availability. It may be noted that apart from spouse and children, all other relations constitute guests and will be governed by hostel rules for guests.

11. Every resident shall maintain a strict code of conduct and shall not indulge in activities which might cause inconvenience to fellow residents, or may be unlawful or prejudicial to the interest of the Centre. (e.g. playing musical instruments, wireless sets, etc., loudly or creating noise by other means.)

12. Every resident will be expected to leave the corridors and the common areas clean and not utilize them for storing any article or effects or for drying clothes, etc. No clothes/linen should be put in the corridors of the hostel for drying, etc. except in designated cloth-drying areas.

13. Every resident is expected to segregate garbage, and drop wet garbage in the garbage cans provided in each wing of the hostel.

14. Cooking appliances, or the use of any other type of appliances or gadgets using fuels such as gas, oil, coke, coal,



etc. will not be permitted in the room. Tea/Coffee could be made using electrically operated gadgets. A common pantry is provided in both the hostels where cooking can be carried out if required. Under special circumstances these may be allowed with prior permission.

15. Complaints and reports pertaining to the cosmetic, electrical or the civil services, or loss or damage should be made in the register kept for the purpose at the Reception of the Hostel. The Hostel-in-charge should be informed of the same.

16. Any hostel resident who is likely to be away from the Centre for a period of more than 30 days shall inform the Hostel In-charge. Any resident who is likely to be away from the Centre for a period of more than 60 days shall vacate the room so that arrangements can be made to have the room available for temporary use. In such a case, the regular allottee will have the option of keeping his/her belongings locked in the room. As far as possible, arrangements for such temporary allotment to a person will be made by the Hostel In-

charge in consultation with the regular allottee. No arrangements can be made by a resident for the occupation of the room during his/her absence.

17. Any allotment is liable to be cancelled if a resident deliberately infringes the rules, or indulges in activities detrimental or prejudicial to the interest of the Centre.

18. Visitors are not permitted in the Hostel premises between 0100 hours and 0600 hours.

3. Wireless

Please note that HBCSE has wireless internet facility in the hostel and throughout the campus. Wireless users are requested to refrain from downloading unauthorized copyrighted materials (movies, TV series etc.) from restricted websites such as torrent.

4. Electricity Charge

Electricity will be charged for allottees who have been given hostel accommodation for more than 6 months. The first 40 units used will not be charged. Usage above 40 units will be charged at Rs. 6.00 per unit.

5. Surrender of Rooms

A resident who would like to surrender the room allotted to him / her shall give a week's notice of his/her intention to vacate. While vacating, the resident shall ensure proper handing over of all furniture items and fixtures and keys to the Hostel Authorities, and acknowledge any loss or damage thereto which he/she shall make good through adequate compensation, as may be decided by the Centre.

6. Compensation

The compensation for the use and the occupation of rooms will be fixed by the Centre from time to time and

will be communicated to the residents. The allotment is further subject to the condition that an allottee, who has been allotted a hostel room for three months or more, will pay a deposit of Rs. 5000/-. The amount of the deposit will be refunded to the allottee after deduction of charges towards breakage of the fittings and fixtures in the room, if any, once the Hostel accommodation is vacated. Once the room is taken charge of by the allottee, till it is properly handed over back to the Centre, no rebate in any of the charges will be allowed for any period of time during which the room remains unoccupied except in cases where it has been vacated by the allottee.

7. Hired Help

Hostel residents who hire help are required to inform the office in advance and submit a police verification report of the concerned hired help.

Currently the Hostel In-charge is Shri J. B. Waghmare

Available online at:

<http://intranet.hbcse.tifr.res.in/local-facilities/terms-and-conditions-for-the-hbcse-hostel/view>

5.6 Library Facility

The library is open from 9.00am to 8.30pm on weekdays and 9.00am to 5.30pm on weekends and selected holidays.

The HBCSE library's carefully selected collection consists of around twenty eight thousand books, bound volumes, and other materials on various subjects. The Library subscribes to 113 Indian and Foreign journals. Research students can borrow a maximum of 30 books and 5 journal issues at a time.



Please note

- Reference books/ thesis will not be issued.
- Books and journals on display will not be issued.
- Books should be returned / renewed after a month.
- While borrowing books from the library, members are requested to write the date, their full name and sign in the appropriate columns given on the book cards. After signing, the book card should be dropped in the box kept at the counter for this purpose.
- To borrow journal issues / CDs please take help from the library staff.
- While returning borrowed library books, please keep them in the wooden box kept at the counter. The CDs/ Journal issues should be handed over to the library staff.

Digital resources

The Library subscribes to around 335 online journals published by various publishers, such as Wiley, Taylor & Francis, Institute of Physics, American Physical Society etc. In addition to these, HBCSE members get access to more than 1000 e-journals subscribed by TIFR (Springer link, JSTOR, Science Direct, AIP etc.). These journals can

be accessed from anywhere in the campus.

DSpace

HBCSE Library has also created a digital repository using DSpace Open Source Software. Users can access full text digital materials such as books, thesis of past students, newspaper and journal articles etc.

Library catalogue (OPAC)

The library has a WEB OPAC (online public access catalogue) which can be accessed through intranet. Users can create their own account, which will help them to get information about list of current & past checkout, access to account information, can create their private lists, make purchase suggestions, view virtual shelf browser etc. Please contact the library staff to create your library account.

To access the Digital resources

and OPAC, please go to the library webpage. (<http://library.hbcse.tifr.res.in/>). If you have any problems accessing library OPAC and digital resources, or any other queries related to library, please contact the library staff.

Book procurement Library personnel can help research scholars procure books published by various Indian and foreign publishers. Users can send their requests through e-mail to the library.

Inter-library loan (ILL)

Books which are not available in HBCSE library, but are available in nearby libraries, can be procured on ILL. The library staff can also help in accessing articles from journals that are not available or accessible from HBCSE.



5.7 Research Meet & Conferences

1. Annual Research Meet

Research thrives on spontaneous exchange and open collaboration. Research work gets accepted and authenticated as new knowledge through a process of peer review -- a process that calls for participation of communities of researchers and field workers at local, national and global levels. The Annual Research Meet (ARM) is a yearly in-house event that supports this community process, focusing on the work of research scholars at HBCSE. Faculty members participate as collaborators and discussants. ARM is conceived as a kind of retreat, which enables pleasant yet intense academic interactions among students and faculty. Its objective is to create and maintain a vigorous collaborative research ambience at HBCSE. The first Annual Research Meet at HBCSE was held during February 11-13, 2010.

ARM is organised by the first year students, and features presentations and talks by Ph.D. students in their second year onwards, as well as by scientific staff. At present, the event is organised in the following way:

After the event dates are finalised,

and important dates in the run-up to the event are announced, students first submit abstracts to indicate their intent to present.

Soon after, presenters suggest faculty discussants for their presentation, and initiate a dialogue with discussants to schedule their submission.

Presenters arrange to provide a draft paper/ write-up to their discussants well in advance. This write-up may be a draft of a research publication (or leading towards a publication). In some cases

students who have recently published research may present that work. It may also be work-in-progress, indicating clearly what aspects of analysis or discussions are yet to be completed.

The student's write-up is read by the discussant before the presentation, and comments and suggestions are given by the discussant after the student's presentation.

For more information on ARM, visit: <http://www.hbcse.tifr.res.in/research-development/arm>

Courtesy: Himangshu Srivastava



Courtesy: Chaitanya Ursekar

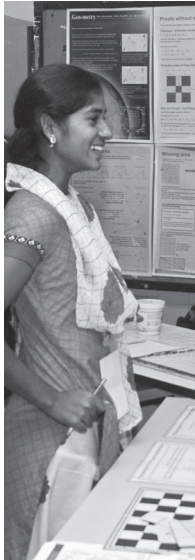
2. epiSTEME

epiSTEME is a leading international conference, organised biennially by the Homi Bhabha Centre for Science Education, focusing on science, technology and mathematics education. These domains are intimately related, at theoretical as well as practical and application levels. While investigating educational issues related to science, technology and mathematics, there are strong uniting themes, originating in philosophy, cognition, history and socio-cultural studies. The epiSTEME series of conferences build on these foundational themes, to provide a common forum for researchers from science, technology and mathematics education. Research scholars are expected to participate in this conference, and make submissions based on their research.

For more information on epiSTEME conferences, visit: <http://www.hbcse.tifr.res.in/episteme>



Courtesy: HBCSE Gallery



Courtesy: HBCSE Gallery

5.8 HBCSE Women's Cell (HWC)

The Homi Bhabha Centre for Science Education is committed to providing an ambience at the workplace where women members can pursue their work with dignity and reassurance. The objectives of the HWC shall be to:

Prevent gender discrimination and sexual harassment, by promoting gender amity amongst all HBCSE employees;

Deal with cases of sexual harassment, in a time bound manner and in accordance with the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013, aiming at ensuring support services to the victimized and termination of the harassment;

Make recommendations to the Centre Director for changes/elaborations in the Rules, Standing orders, etc, to make them gender just;

Recommend appropriate punitive action against the guilty party(ies) to the Centre Director. The HWC is required to

submit to the Centre Director, HBCSE, a summary report of work done at the end of every calendar year: e.g., the report for 2015 should be submitted on or about December 31, 2015.

The following members are appointed to the HBCSE Women's Cell (HWC) from February 24, 2021:

- Sugra Chunawala (Chair) - 2230 - sugrac@hbcse.tifr.res.in
- Ayush Gupta - 2229 - ayush@hbcse.tifr.res.in
- Sneha Khandekar (External Member) - 2338 - snehakhandekar@hotmail.com
- Manoj Nair - 2119 - manoj@hbcse.tifr.res.in
- Indrani Sen - 2314 - indrani@hbcse.tifr.res.in
- Swapnila Desai (Secretary) - 2115 - swapnila@hbcse.tifr.res.in

The HWC shall perform the functions of the "Internal Complaints Committee" under the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013. It shall deal with all complaints relating to sexual harassment at HBCSE in accordance with the Act. It shall undertake initiatives and programmes that create awareness about the provisions of the Act and gender related issues that may arise at the workplace, and work towards building an ambience that ensures the safety and security of women members and visitors in the Centre.

Any member of the Cell may be contacted regarding cases of sexual harassment or other activities of the Cell.

Email: womenscell@hbcse.tifr.res.in

For more information on HBCSE Women's Cell and its activities, please visit: <http://www.hbcse.tifr.res.in/womenscell>

5.9. Anti-Ragging Committee

The HBCSE Anti-Ragging Committee was constituted on November 11, 2016 to advise the Centre Director in dealing with any reported incident of ragging and to take measures to prevent such events.

The following members are appointed to the HBCSE Anti-Ragging Committee from March 16, 2018.

Prof. Sugra Chunawala (Dean, HBCSE Faculty) - Chair (Room No.230, Main Building, HBCSE; Mob.:9833547752)

Prof. Rekha Vartak (Room No.104, Olympiad Building, HBCSE; Mob.:9819516663)

Dr. Ankush Gupta (Room No.204, Olympiad Building, HBCSE; Mob.:8130930054)

Ms. Sandhya Rajashekar - Secretary (Room G17-G18, Main Building, HBCSE; Mob.:9833188976)

Mr. Joseph Salve (Room No.218, Main Building, HBCSE; Mob.:7875156484)

Prof. Rekha Vartak and Dr. Ankush Gupta are wardens for the Olympiad and NIUS hostels.

The HBCSE Anti-Ragging Committee shall perform as per rules and regulations provided by University Grant Commission (UGC) in connection with ragging related matters. Details are provided on the weblink of UGC : www.ugc.ac.in/page/Ragging-Related-Circulars.aspx

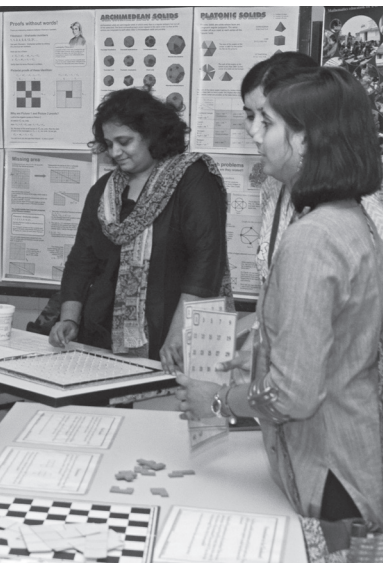
The definition of ragging is uploaded at: www.hbcse.tifr.res.in/what-constitutes-ragging.pdf For information on the HBCSE Anti-Ragging Regulations, please visit: www.hbcse.tifr.res.in/data/pdf/anti-ragging-committee.pdf

Any member of the Committee may be contacted by a students/s regarding cases of ragging, harassment or any such activities by a student/s.

National Anti-Ragging Helpline

Phone No.: 1800-180-5522

Email: helpline@antiragging.in



Courtesy: HBCSE Gallery



Courtesy: HBCSE Gallery

6 Useful Telephone Numbers at HBCSE

Location	Extension	Telephone Number
Centre Director Office	2204/2205	25562132
Dean’s Office	2230	25570813
Head, Administration Office	2111	25564209
Technical Services Section	2306/2308	25072306
Central Computer Facility	2108/2124	25072124
Library	2303/2337	25072303
Main Building Canteen	2302	25072302
Publications Cell	2114	25072114
Stores	2120	25072120
Accounts	2116	25072116
Establishment	2115/2335	25072115
Purchase	2117	25072117

Wardens for Olympiad and NIUS hostels:
Prof. Rekha Vartak — Room No.104, Olympiad Building, HBCSE. Mob.:9819516663
Dr. Ankush Gupta — Room No.204, Olympiad Building, HBCSE. Mob.:8130930054