

2 Senate Meeting Agenda dated 27 March 2009

Discuss the following policies.

1. B.Tech IT Programme structure
2. Community and self growth Course work
3. Structure of PhD Program
4. Collaborative PhD program
5. Policy for termination of program due to poor academic performance

Structure of “BTech in IT” Program at IIT Delhi – Draft

1. Objectives

IIT Delhi aims to encourage research and innovation in IT and some of its domain areas. The objective of the BTech program is to prepare students to undertake careers involving innovation and problem solving using IT, or to undertake advanced studies for research careers in IT or the domain areas.

2. Background

While Computer Science focuses on the foundations of computing, IT as a discipline focuses on satisfying computing technology needs of organizations. So, in a continuum between principles and application, IT is more towards application, with the goal being to apply knowledge of computing and mathematics for solving problems.

IT is now becoming a discipline that is distinct from Computer Science, and ACM has a special curriculum now for it. However, foundations of IT are still in Computer Science. Hence, it is desirable and feasible to have a CS-based IT program. Such a program will allow a graduate of the program to choose a career in CS or applied aspects of computing.

IIT Delhi aims to have such a curriculum which is CS-based, and which will develop in students skills for problem solving using engineering and research approaches, in the field of IT or some domains of IT. As the range of possible domain and specialization areas is large, it plans to have a strong foundational program, which can be built upon for specializing in different areas of IT or IT domains. In IITD, this foundational program will heavily derive from Computer Science, and will be supplemented with suitable IT oriented courses.

3. The “BTech in IT” Program

For now, IIT Delhi plans to have only one BTech program – BTech in IT. Any program has to be designed such that an average student admitted into the program can complete it successfully in the duration for which it is designed. At the same time, a program must also challenge the brighter and more ambitious students. Clearly one uniform program cannot satisfy both these desired objectives.

To satisfy both these goals, the Institute will have the main BTech program which will be designed keeping the average student in mind. In addition, the institute will also have a program of BTech with Honors (and later Minor also) which a deserving student can do by doing extra courses and projects. So a student in the BTech program can graduate with a BTech, or a BTech with Honors (or BTech with a minor). The program therefore allows students of different capabilities to remain challenged at a level appropriate for them.

As the BTech program is only for IT, it offers an opportunity in designing the curriculum which is not available when designing the program for multiple disciplines (as is the case with most Engineering Institutes). Most engineering programs start with general courses in Sciences and Engineering, and then migrate to specialized courses for the disciplines. While these courses are indeed foundational for many engineering disciplines, they are not foundational for IT – rather they can be treated as application domains (as is evidenced from the fact that most sciences and Engineering disciplines heavily use IT now). Hence, in our BTech program we “invert the pyramid” and start with computing oriented courses first, and do the general and sciences courses later. Besides being better suited for an IT program, it also enables the possibility of students seeing newer applications and possibilities of relating IT with these subjects.

With this approach, the BTech program can be divided broadly in two halves. The first half will focus on providing the foundations of the computing discipline (as well as some other aspects). This part will be highly structured, due to its nature. The second part is for further developing the skills and knowledge of the students in various topics – computing and non-computing. This part also provides limited specialization. This second part will necessarily not be strongly structured and different students will follow different paths and take different set of courses in it. Before the program is described, the structure of a course and concept of units is explained.

3.1 Course Units

Each course provides some academic units to a student. A course can be

- A regular course of 4 units. It will have 3 hrs lectures per week, with a total of 39 hours of lectures (13 weeks). In addition, one hour of interaction per week is expected which may be in form of structured tutorials or labs. A course may or may not have lab-based assignments or projects, depending on the course.
- A 2-units course. Such a course will have 1.5 hrs lectures per week, or may have 3 lectures per week for half the semester. The total lectures hours will be 18. Intensive short-term courses of 2 units are also possible, though it is expected that the duration of such a course will not be less than 3 weeks. It may or may not have tutorials and labs.
- A 1 unit course. Such a course is likely to be run as a short course on a very specialized topic. Such courses may also be run during vacations. A 1-credit course will have a total of about 9-10 hours of lecture. For pedagogical reasons, such a course cannot be run over a period of less than 1 week; a period of 2-weeks or more is preferred.

It is expected that some 2-unit and 1-unit courses will be conducted by visiting faculty from across the world. Some courses (e.g. skill development, community work, and self growth) may also be designed as 2-unit courses.

3.2 The Foundation Program and Core Courses

The basic foundations of computing will be covered through core courses, which are compulsory for all students, and which will be done mostly in the first half of the program. This foundation program provides the basic knowledge about CSE/IT, and can be viewed as consisting of four major streams in which capabilities of the students have to be built. These streams are:

- Software
- Hardware
- Theory
- Systems

<p>The intent of this part is to develop certain level of knowledge and capability in students in each of these areas. In addition to CSE/IT courses, the foundation program consists of courses to build communication skills, which is considered foundational for any profession, and has been recognized world over as the skill in which most engineers are weak. This capability for each area can be expressed as the post condition for that stream, which specifies at a high level what capability and knowledge should be achieved by the end of the foundation program for the stream. The desired post condition for the foundation program for each stream is</p>	<p><i>Post Condition of different Streams in the Foundation Program</i></p>
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given below. <i>CSE Stream</i>	
Software	<ul style="list-style-type: none">• Primary: Ability to develop an efficient and good quality 1000 line program to solve the target problems

Community Work: A 1-2 unit Course

Credits: 1-2; **Pre-requisites:** None; **When Offered:** This course can be done in any semester; in particular it can be done in “summer semester”.

Post Condition: After successfully completing this course, a student should have developed a decent understanding of some society/community issue, nature of solutions, and should have contributed through a group towards improving the community/society in the chosen area.

Brief Description.

One of the goals of technical education is to produce technologists and scientists who will also provide solutions to problems/issues in our society. As class room teaching is often devoid of direct relation with the larger civic society, this course module attempts to bridge this gap.

In this course, the student is expected to contribute directly to some societal issue that he/she is really concerned about, by working in a group of like-minded people. The student can do this by working through an NGO, or any such group, of his/her choice, which is working in the area which the student is excited about. Alternatively, a group of students can work together on some issue concerning the larger civic society, and may form this group for this purpose. (If a students form a group to work for a cause, if support is needed, the institute will provide some financial support.)

Evaluation

This course will be a satisfactory/unsatisfactory course. As per our general framework, for a 1 unit course, about 4-5 hrs per week (for a total of about 50+ hours) on an average should be spent on this course. Each student will be required to maintain a booklet in which work done every week will be logged. The booklet will be signed regularly by a responsible person in the NGO where the student is working. If students are working in a group of their own, any other member of the group can sign. In the end, the student should get a letter from the “supervisor” from the NGO. Also, at the end of the work, the student will write a small essay/report of the work done, how he/she feels about it, etc. A copy of the log, the letter, and the report will be submitted to the Institute within the first week of the next semester. Students may be requested to share their experience with other students. Based on all the information, the student will get a grade.

Resources

N/A – whatever the work requires.

Booklet Structure

Clearly no single booklet structure will suit all types of work. However, some things are essential:

- Title of the activity, and name, roll no, tel of the student
- Goals – what the NGO/group wants you to achieve during the semester (if a group is formed, this will be one common document)
- Plan – how you plan to achieve the goal. This should be developed based on discussion with the NGO (again for the group, this will be one common document)
- Weekly log – for each week, how many hours were spent, and what specific things were done in that week.

Collaborative PhD Program in Focused Areas of CS/IT between IIIT Delhi and a R&D Center or an Overseas University

Indraprastha Institute of Information Technology is a research-led institute started by Delhi Govt. One of the goals of IIIT is to engage in joint R&D globally. For this, it plans to start a collaborative-PhD program in specific areas of computer science/IT with some select Institutes/groups/centers. This proposal gives the contours of such a program.

- Applications will be invited for this joint program, and for selection, the candidates can be jointly evaluated or interviewed (through telephone/video) by IIIT Delhi and the partner group for final selection.
- The selected candidate will be admitted to the PhD program in IIIT Delhi.
- Admitted candidates will do their research work under the joint supervision of a faculty member in IIIT Delhi and a faculty member in the collaborating group, who will be the co-supervisor.
- The candidate spends his first 2-4 semesters in IIIT Delhi doing his courses as well as starting the thesis work. During this period the co-supervisor in the collaborating group will interact regularly by telephone/video to guide the scholar in thesis problem selection, approach being taken, etc. The supervisor may visit IIIT Delhi, or invite the scholar for short/summer visits. IIIT Delhi will pay the stipend in India for this period.
- At a suitable time, the scholar goes to the collaborating group for a period of a few months to about a year. In this stay, the focus is on vigorously pursuing the thesis work, though the scholar can also take some courses on audit. During this period, the stipend for the stay is provided by the collaborative group. (Visa and payment issues will have to be properly resolved for this.)
- After spending this period with the partner group, the scholar returns to IIITD to complete his PhD.
- Upon successful completion of the requirements for PhD, the degree will be awarded by IIIT Delhi. The thesis will list both supervisors. Most publications resulting from this will be jointly with both supervisors.

Some advantages of this program are that the overall cost is lower, as compared to a candidate spending full time in the overseas university, and that the research can have inputs from both India and Overseas. From the joint-supervisor perspective, he/she can get work done by having to pay only for one year. From IIITD's perspective, this program can help attract good scholars to the PhD program. Overall, this looks like a good win-win program.

Self Growth: A 1-2 unit Course

Credits: 1 or 2; **Pre-requisites:** None; **When Offered:** This course can be done in any semester; in particular it can be done in “summer semester”.

Post Condition: After successfully completing this course, a student should have developed some skill in the chosen area.

Brief Description.

The purpose of this course is to help students develop their interests beyond the formal curriculum. It recognizes the fact that education is not limited to classroom, and that a broad education must permit growth of students in areas beyond the curriculum. It can be viewed as encouraging students to develop other interests and hobbies, and pursue them. In this course, a student can decide to build some skill/expertise in some area, develop a plan for achieving it, and then execute the plan. At the end of the semester, the student will have to demonstrate that the stated goals have been achieved and necessary effort was spent. Areas could be anything which requires dedicated effort over time to build a skill. Examples are carpentry, bird watching, music (vocal or instrumental), plumbing, learning a new language – Indian or foreign, photography, painting, sketching, etc. (This course is different from independent study/minor project, which are expected to be more oriented towards traditional academic topics)

Evaluation

This course will have only satisfactory/unsatisfactory grade. As per our general framework, for a 1 unit course, about 3-5 hrs per week on an average (for a total of 50+ hours in a semester) should be spent on this course. Each student will be required to maintain a booklet for this course. In the booklet, the goals for the semester will be recorded, along with a plan to achieve them. These will be shown to an assigned instructor within the first two weeks of the semester (or it could be shown in the end of the previous semester). The booklet will have a weekly log, in which the student will record the effort spent each week on this course, and record what activities were done. In the end of the semester (or within the first two weeks of the monsoon semester, in case of summer), the student will show the full log to the instructor, and demonstrate his/her skill achieved (perhaps to the entire class) during this semester. Based on all the information, the student will get a grade.

Resources

Any resources may be used – books, magazines, websites, groups, etc

Booklet Structure

Clearly no one booklet structure will suit all activities. However, some things are essential:

- Title of the activity, and name, roll no, tel of the student
- Current capability/skill in this area
- Goals – what you want to achieve during the semester, i.e. some statement that you should be able to make at the end of the semester (e.g. “to be able to play the tabla, and play 5 different tals” or “to have recorded at least 50 birds in my checklist and have the ability to identify most of them easily”)
- Plan – how you plan to achieve the goal. E.g. will you read and then practice, join a club, form a group and get help from someone to guide the group, etc.
- Weekly log – for each week, how many hours were spent, and what specific things were done in that week

Structure of the PhD Program

The PhD program at IIITD is like any other PhD program with a focus on research. A candidate with a BTech or MTech in CS/IT or a related discipline can be admitted into the PhD program.

Main Requirements

For completing a PhD, the main requirements are:

- **Course Work.** A student who has entered the PhD program after a BTech is expected to take 20 units of course work (i.e. equivalent of 5 regular courses). A student with a MTech is expected to complete 12 units. For candidates with work experience, relevant experience may be counted as advanced knowledge in the area of expertise(s) and experience(s) – the PG committee will determine if the experience is relevant to count as advanced knowledge, and how many credits it may be given. Students with insufficient background may be required to do additional courses to obtain sufficient breadth. Courses may be done in other recognized institutes and approved for counting for the fulfillment of the credit requirement. Independent study courses may also be used to satisfy the credit requirement. A PhD student must obtain at least a 7.0 CGPA in the course work.
- **Open Seminar and viva.** A PhD candidate must give an open seminar in a chosen topic, which is related to (but not exactly the same) his/her thesis area. The student, in consultation with his/her advisor, will submit a short proposal about the topic and the list of papers/resources which will be used for this presentation. This presentation should generally be completed in the 2nd semester of the student enrolling the PhD program. The presentation will be followed by a viva by a committee formed for the candidate. Passing this viva successfully will formally make the candidate a PhD scholar. (This is equivalent to the Qualifiers or Comprehensive in many other places).
- **Thesis work.** After this Open Seminar, the focus is on the PhD thesis work. Though this is primarily between the scholar and his/her supervisor, a scholar is expected to make a yearly presentation about the work done in the last year. It is expected that one of these will be thesis proposal presentation, where the scholar will present the problem on which he/she plans to work on in the thesis.

Thesis Evaluation and final thesis defense

All PhD theses will be evaluated by experts and a thesis defense must be held. The thesis defense will be evaluated by the orals board which will comprise an external expert who was also the thesis examiner, an expert from within IIITD (or a neighboring Institute) who was also the thesis examiner, and the supervisor. The following guidelines will be used for thesis evaluation.

- If the student has two or more accepted papers in high quality conferences or journals, then the thesis is deemed to be suitable for a PhD (suitable guidelines will be built later to decide which conferences/journals can be accepted for this purpose, but it is expected that the conferences and journals that will be acceptable for this purpose will be identified in consultation with the advisor *before* the student writes or submits any papers). In this case, the thesis will be sent to two experts – one of which could be from within IIITD. The experts will be invited for the defense (generally between 1 and 4 weeks after submission), and will be requested to submit

their suggestions, if any, before the end of the defense. The scholar will have to address any issues raised by the experts, which will be validated by the scholar's advisor. Upon completing this, the PhD may be granted.

- If the student has one accepted paper in high quality conference or journal, then the thesis will be sent to three experts – one of which could be from IIITD. The oral defense can be scheduled after at least two reports recommending acceptance have been received. (If these are the first two reports, the third reviewer is suitably informed and requested to submit the report within 2 weeks). The oral board will examine if the issues raised by experts have been satisfactorily addressed. On passing the defense, PhD may be granted.
- If a scholar only has submitted papers, then the oral can only be held after reports of all three experts have arrived and all three have recommended acceptance. The oral board will examine if the issues raised by experts have been satisfactorily addressed. On passing the defense, PhD may be granted.

Exit Clause

If the PhD scholar &/or his supervisors feel that the scholar may not be able to complete the PhD, he/she may leave the program with a MS(R) (MS by Research) degree, provided the requirements for the same are fulfilled. The requirements for the MS(R) degree are the same as PhD, except for the thesis – the thesis for MSR will generally represent smaller work. The thesis will be evaluated by a group of two examiners, one of whom could be from IIITD. There will be an open presentation on the thesis as well. (The MS(R) option will also be considered for those cases where the scholar has submitted the thesis for PhD, but the experts did not find it worthy of a PhD.)

A Rough Schedule for PhD

Though the PhD is in Computer Science, students are likely to be admitted for work in focused areas. In other words, they are expected to know which area of Computer Science (and therefore possible supervisors) they will work in when they enter the PhD program. Hence, a scholar can move forward quickly. The rough schedule then is as follows.

- **Semester 1.** The student should mostly do courses in this semester. Some courses could be to fill any holes in the breadth, others could be to support the research. One of the courses should be directly in the area of work. By the end of this semester, the student should have finalized the supervisor, if not already done so.
- **Semester 2.** Some more courses could be done. The student should write at least one survey paper in his area of interest, and also define the problem area in which he wishes to work. The open seminar and viva should be completed this semester, particularly for those who joined the PhD program with a prior MTech.
- **Semester 3 and 4.** Problem to work on in PhD should be well defined, and the student should make some progress in this. It is expected that by the end of semester 4, the student should have completed at least one research paper.
- **Semester 5 and 6.** Focus in entirely on research and the student should aim to complete at least 2 more papers in this year.
- **Semester 7 and 8.** If the student has already make sufficient progress and have sufficient number of papers to his credit, he can finish early and leave. Otherwise, this year is to be used

for writing the thesis, more papers, and developing a further research agenda. Last semester will also be used for thesis defense.

Termination from the Program due to Poor Academic Performance

For continuing in the program in which the student has been admitted, the student has to show a satisfactory academic performance. If the academic performance falls short, a student may be placed under warning or probation, or the registration may be terminated. This note describes the rules for these.

Warning and Probation

A student satisfies the warning condition if he/she fails in 25% or more of the units he/she had registered for in the previous semester, and probation condition, if he/she fails in 50% or more units. If after any semester a student satisfies the warning/probation condition, he/she will be placed under warning/probation.

A student who is under warning, will get “under probation” if he/she satisfies the warning condition in another semester.

Termination of Registration due to Poor Academic Performance

If a student who is under probation satisfies the warning condition in another semester, his/her registration will be terminated, i.e. he/she will have to leave the Institute. If a student who is under warning satisfies the probation condition in any semester, his/her registration will also be terminated.

I year Students: If a student is unable to complete at least 22 units at the end of II semester of his/her stay at the Institute, he/she will have to repeat the first year. If a student is not able to successfully complete at least 18 units at the end of II semester of his/her stay at the Institute, his/her registration would be terminated (which means that the student will be asked to leave the Institute).

Appeals

A student who has been placed under warning/probation or whose registration has been terminated, has a right to appeal against the decision. All such appeals are to be made to the Academic Senate, and the decision of the Academic Senate shall be final.

Minutes of the Second (2nd) Senate Meeting held on Friday, March 27, 2009, IIIT (Transit) Campus in NSIT, Dwarka

Members Present: PI Jalote, V. Bansal, A. Kiehn, V. Goyal, M. Vatsa, R. Singh (IIITD), KK Biswas (IITD), Saugat Sen (Cadence).

Through Audio Conference: R. Moona (IITK), C. Anantaram (TCS), M. Gupta (IBM), Kamal Karlapalem (IITH)

1. The “B. Tech in IT” program

The Director gave a brief overview of the BTech program – the objectives, its foundation part as well as its elective part, and how these parts and their structure was evolved keeping in mind the end goals. The members felt that the program is well structured and contemporary. The following suggestions were made:

- Aspects of concurrent programming should be included. Perhaps through courses like the “advanced programming” course in second year
- DS + Algo may be called DS; Specialized stream-non IT may be called Specialized stream – applications
- Option to make available courses on Fundamentals of EE, circuit theory, signals and system should be explored
- Project work should be emphasized in courses where appropriate
- For a “project” course, the number of units may be determined after the project; also for a project grade perhaps a satisfactory/unsatisfactory grade may be considered – it can avoid issues of setting elaborate evaluative structures to determine the grade, particularly if the project is done as internship.

After discussion, the structure of BTech inIT program was approved. Members were requested to suggest other courses that can be added to the list of electives

2. “Community Work” and “Self Growth” Courses

Members appreciated the concept of taking education beyond the class room and felt that these courses were indeed in the right director and bring in some new thought into the curriculum. The courses were approved.

3. The structure of the PhD Program

The following points emerged in the discussion.

- For course work, to not tie down students with sufficient background in course work, a clause “some of these requirements may be waived / reduced for candidates with necessary background” may be added
- The rule of “two papers in good conferences means that the thesis is deemed to be acceptable” needs to be thought and discussed more. As there is plenty of time for this, this rule will be discussed and finalized later.

After discussion, the PhD program structure was approved (except for the above)

4. Collaborative PhD Program

The collaborative PhD program with a partner group / institute was approved as it envisages a co-supervisor and spending time in another Institute by a PhD scholar – both of which are generally allowed by most Institutes.

5. Policy for termination from program due to poor academic performance

It was felt that the general framework of warning, probation, and expulsion is sound. However, it was felt that the detailed rules for transition between these states need to be carefully developed and can be done later. However, the proposed rule for first year students for repeating the year as well as for termination was accepted.

The meeting ended with thanks from the Chair to all members for attending the meeting and contributing to its deliberations.
