AGENDA

Seventeenth (17th) Meeting of SENATE of

Indraprastha Institute of Information Technology, Delhi

Date: 13th January, 2012

Day: Friday

Time: 03.00 PM

Venue: Conference Room
3rd Floor, Library Building
NSIT Campus,
Sector-3, Dwarka,
New Delhi-110078

SEVENTEENTH (17TH) MEETING OF SENATE OF IIIT-DELHI
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SEVENTEENTH (17TH) MEETING OF SENATE OF IIIT-DELHI

AGENDA

17.0   Opening remarks of the Chairman

17.1   Confirmation of minutes of the 16th Senate meeting
The minutes of 16th Senate meeting were circulated among the members, which may be considered for confirmation. A copy of the same is placed at (Annexure 1).

17.2   Granting MTech to Sangeeta
Sangeeta migrated to MTech from PhD and completed the requirements to award the degree of MTech. The provisional degree and the form prepared for her showing the checking of requirements put up as (Annexure 2).

17.3   Admitting students in PhD through the direct admission from MTech route

Students above CGPA of 8.0 were invited to apply for direct admission. The following have accepted the offer.

1. Anshu Malhotra   (MT10001)
2. Anupama Aggarwal   (MT10002)
3. Chandrika Bharadwaj (MT10004)
4. Komal Sachdeva   (MT11007)
5. Madhvi Gupta   (MT10009)
6. Mohona Ghosh   (MT10011)
7. Niharika Sachdeva   (MT10012)
8. Prateek Dewan   (MT10014)
9. Sneha Shukla   (MT10019)

Niharika Sachdeva has joined the program. Anupama, Chandrika, Komal, Mohona, Prateek requested for extension of date of joining. Response from Anshu, Madhvi and Sneha is awaited.

17.4   Rolling PhD admission - As per the provision of rolling PhD admission, Mr. Madhur Hasija joined as a PhD scholar under MUC group on 2nd January, 2012.

17.5   Panel of names for selection committee in US:
The Institute will be holding selections in US in April/May - this time for CS as well as ECE. As before, selection committee will be formed from faculty members from host Universities (in some cases, Prof. Sumit Roy,

Ext. Chairman for ECE, may join). It is proposed that all Associate Professors and above from any reputed US/Canada University may be considered as part of the panel for experts for selection committee. (The final selection committee will be as approved by the Chairman from the panel.)

17.6   Change the name of the BTech (IT) program to BTech (CSE)
The attached note gives the reasons for this, and the due diligence done so far. (Annexure 3)

17.7   Changes in regulations for BTech (IT)
As ECE program is being started, and as there is a strong case of having a common first year between the two programs, some changes are needed in the BTech(IT) program. The following changes are proposed in the BTech (IT) program.

- This is now stated as requirements for CSE.
- Math-1 has been made a core course, and TOC has been made an elective.
- Electronic Circuit introduced as a core course in 2nd semester.
- The elective slots in 2nd year has been marked as Engineering Science/Maths and it has been clarified that in these slots, students can take only from the list of courses specified for them.
- Clarified that 2 credits of Self Growth (SG) and 2 credits of Community Work (CW) must be done.
- Clarified that only 4 credits of BTP/IP/IS/UR can be counted for meeting the 8 credit CSE/Math per semester requirement.
- Clarification that total credits is 20 courses in first 2 years, and 18 in last two.
- BTP credit range changed to 8 to 16 credits.

17.8   Starting the BTech ECE program
The Institute proposes to start the BTech (ECE) program. A short document giving the broad background and the basic structure and the current thinking is given. Further details will be evolved over the semester. (Annexure 4)

17.9   Changes proposed to the PG Manual and MTech regulations
Changes to the MTech Regulations are:
- Clarified that "sufficient core courses should be offered so a student can complete the core requirement in first two semesters", and some courses added to the three sets;

- The following regulation deleted: "Assistantship is available only for *with*-thesis option. A student on Assistantship will have a residency requirement of 4 semesters."
- Added that "Limited number of partial or full fee-waivers may be provided" (since fee waiver is now delinked from assistantship in the PG regulations).

Based on our experience, some changes to the regulations of PG manual and MTech program are proposed as per (Annexure 5)

17.10 Fellowship model for MTech
As proposed by a committee set for it – the recommendation is attached. (Annexure 6)

17.11 Changing admission criteria to the BTech program
A note on this is attached as (Annexure 7)

17.12 Formation of the UG Committee (UGC)

For sometime a need has been felt that, like the PGC, we should establish a UGC which can address the various UG program implementation related issues that keep coming up. We are therefore establishing a UGC, which will start functioning from this semester itself.

The committee constitution is as follows: Dr. Astrid – Chair, Dr. Raja - as PGC Chair, Dr. Debajyoti, Dr. Somitra, Dr. RN Biswas, Two or more students - the above group will decide on the number and selection method and select. A list of courses for the Winter Semester2012 is provided as (Annexure 8). A brief report from the UGC will be placed/discussed during the meeting.

17.13 Proposal to start an MTech Specialization in Mobile Computing:

Institute plans to start this specialization from 2012. The motivation for the program, the faculty involved, the initial structure and a note on this is enclosed as (Annexure 9). Further details about the program will be evolved by the group involved in the coming months.

17.14 Any other item, with the permission of the chair.

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Minutes of the 16th Senate Meeting of IIIT-D held on August 1, 2011 at 03.00 PM
in Conference Room, IIIT-Delhi, Library Building, NSIT Campus, Sec-3, Dwarka, New Delhi

Following members were present:
- Prof. Pankaj Jalote   -   Chairman
- Prof. K. K. Biswas   -   Member (from IIT Delhi)
- Dr. Amarjeet Singh   -   Member
- Dr. Anirban Mondal   -   Member
- Dr. Astrid Kiehn   -   Member
- Dr. Mayank Vatsa   -   Member
- Dr. Ponnurangam Kumaraguru   -   Member
- Dr. Pushpendra Singh   -   Member
- Dr. Richa Singh   -   Member
- Dr. Vikram Goyal   -   Member
- Mr. Vivek Tiwari   -   Secretary

Following members participated via telecon:

- Prof. Dheeraj Sanghi   -   Member (from IIT Kanpur)
- Mr. C. Anantaram   -   Member (from TCS)
- Mr. Mukesh Mohania   -   Member (from IBM)
- Mr. Sanjay Bahl   -   Member (from Microsoft)

Special Invitees:
- Dr. Debajyoti Bera   -   Faculty IIIT-D
- Dr. Gaurav Gupta   -   Faculty IIIT-D
- Dr. Saket Srivastava   -   Faculty IIIT-D
- Dr. Somitra Kumar Sanadhya   -   Faculty IIIT-D
- Dr. Subhasis Banerjee   -   Faculty IIIT-D
- Dr. Vinayak Naik   -   Faculty IIIT-D

16.0   **Opening remarks of the Chairman**

The Chairman extended a warm welcome to all the members to the meeting. The members who could not attend the meeting were granted leave of absence.

16.1 **Confirmation of minutes of the 15th Senate meeting**
In the agenda item 15.10(iv) regarding Minimum/Maximum credits for BTP needed discussion. The Senate had that BTPs can be taken for 8, 12 or 16 credits.

With this amendment, the minutes of 15th Senate meeting is confirmed.

16.2 **Welcome to new members; thanks to outgoing members**.
The Chairman thanked all the outgoing members for their support and valuable inputs and welcomed the new members: Dr. Astrid Kiehn (DOAA i/c), Dr. Debajyoti Bera, Dr. Gaurav Gupta, Dr. Saket Srivastava, Dr. Somitra Kumar Sanadhya, Dr. Subhasis Banerjee, Dr. Vinayak Naik, Dr. Shishir Nagaraja.

16.3 **Announcements - including relevant Board decisions.**
There were no announcements.

16.4 **Accepting the students who have been given admission and who have accepted the admission into the various programs**.

Summary of admissions for AY 2011-12 is:
- PhD : 7
- MTech (CS) specialization in Information Security   : 17
- MTech (CS) specialization in Data Engineering   : 18
- BTech (IT) : 119

The Senate accepted all the admitted students.

16.5 **PG Committee's recommendations and decisions on various issues.**

As per the **Annexure 3,** the Senate discussed item no. 7 i.e. **Extension for PhD Comprehensive date** and suggested that the PG Regulation needs to be rephrased to include this recommendation. Ultimately all the recommendations of the PGC were accepted.

16.6 **Report from the appeals committee.**

Recommendations as per **Annexure 4** were accepted by the senate.

16.7 **CGPA/policy for admitting students from MTech into PhD**.
The senate had earlier agreed to allow students in our MTech program who are performing well to move to PhD, while getting their MTech on the way. It is desirable to also build a policy on admitting students directly from the MTech.

After some discussions, it was decided that a student with above 8.0 CGPA in IIIT-Delhi (with a minimum of 20 credits) with the recommendation of two faculty members may be offered direct admission into the PhD program.

16.8 **Starting the practice of giving appreciation letters to instructors who get very good student feedback.**

It was agreed that this practice, which is followed in many Institutes, is a good practice to follow as it respects and recognizes good instruction. It was agreed that instructors of courses that receive a significant number of student feedback (around 20 and a reasonable percentage of the total class) may be considered as eligible for the appreciation letter. Chairman, Senate will decide the criteria for issuing the letter from among the eligible faculty members.

16.9 **Starting "Undergraduate Research" as a course like Independent Study / project**.

Senate agreed to it.

16.10 **Process for awards at graduation time** – set up sub committees to define this.

The Senate agreed to form a committee under Prof. Dheeraj Sanghi for this. Chairman Senate would identify the other members of this committee.

16.11 **Planning for first convocation** –
Initial brainstorming indicated that beginning of August may be the most optimal date. In May/June many students would be out of station (internship, holidays), and from late August programs in the US would start. August will also give opportunity to students to clear any backlogs during summer and graduate with their batch. The student representatives were asked to inquire from their batch what they would prefer most.

16.12 **Allowing PhD students to get MTech also:**

Deferred for further discussion as there is no immediate request for the same.

16.13 **Any other item, with the permission of the Chair**.

Some discussions regarding core and elective courses were done but later the items were deferred.

The meeting ended with a vote of thanks.

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<u>**Serial No.**</u>

PROVISIONAL DEGREE CERTIFICATE FOR SANGEETA

This is to certify that **Ms. <u>Sangeeta</u>** <u>(Roll.No.MT10021)</u> has successfully completed all the requirements of the degree of **Master of Technology** in **Computer Science** of this University in 2011. She shall be awarded the degree in ensuing Annual Convocation. Her cumulative grade point average (CGPA) is **8.68** on the scale of **10.**

Dated: Authorised Signatory

Requirements for award of M.Tech. degree

Name of student   :   **Ms. Sangeeta**

Programme   :   **MTech (CS) with Thesis**

Roll No.   :   **MT10021**

(*initially admitted in PhD programme and later migrated to MTech during Winter Sem 2011)*

Thesis Title   : **Static Technique for Fault Localization Using Character N-Gram Based Information Retrieval Model**

Date of Thesis Defense: **Thursday, 13th October, 2011**

Thesis Defense Report: **Approved**

Credit requirements

Sl.No.	Requirement	Remarks
1.	**Total Minimum Credit : 48** ➢ Minimum course credits : 32 ➢ Minimum Thesis units : 16	**Done** Done Done
2.	**12 credits from Core courses** ➢ Theory basket ➢ Software basket ➢ Systems basket	**Done** Done Done Done
3.	In Electives**,** at most 4 credits of "Independent Study" and 4 credits of "Minor Project"	She has not done any Independent Study or Minor Project.
4.	*Minimum Graduating CGPA is 6.5*	earned **CGPA 8.68**

The above details have been verified and the student has completed the requirements of the programme.

Date: **AM (Academics)**

PGC recommends for the award of the degree.

Date: **PG Chair**

DOAA recommends to **Academic Senate** to process the award of the Degree

Date: **Dean of Academic Affairs (DOAA)**

Renaming the BTech(IT) program to BTech(CSE)

When we started the UG program, Board had decided that we will have it in IT, rather than CS, so that we can focus on application domains. Now that we are rolling out ECE program, it may be appropriate to consider naming it Computer Science and Engineering (CSE) (not just CS), with E representing "Engineering solutions (using CS) for domains". Some of the reasons for making this change are:

- IT is a broad theme, and solutions using IT have two main components: computing/software aspects, and the platform or hardware aspects. Now that we are starting ECE, which covers the hardware layers (of computers and communication systems), it is proper to have the other program, which focuses on the computing/software, named suitably. If we were to have only one BTech program (as, for example, DAIICT has done), then having a more general program in IT would have been desirable. With ECE, it is desirable to call the current program as CSE.
- Our current program really covers computer science core in the first four semesters, then has elective courses which focus on their application in technology as well as domain areas. This vision really fits CSE well – as it explicitly has Engineering of solutions embedded in it.
- In India, in general, CS (or CSE) is viewed as higher than IT in pecking order. So, while we may create a high end education program, IT tag will "pull its value down".
- In US (and perhaps other countries as well), there are very few programs in IT - most programs are in CS or CSE. Having IT will put our students at a disadvantage when applying for higher studies.
- IT is not a discipline (it was perhaps a creation of AICTE largely to allow colleges to have more seats). Indeed "technology" does not form a discipline - engineering/science/etc do. So IT as an "discipline" is somewhat bothersome from an academic /rigor perspective
- IIIT Hyderabad has two BTechs only - in CSE and ECE. It does not have a BTech(IT) degree.

This matter has been discussed in the faculty meeting – the faculty endorses this view. It has been discussed with all the batches separately - students overwhelmingly support this. In light of the above, the following resolution is proposed:

- The Institute change the BTech(IT) program's name to BTech(CSE), without any change in focus of the program. The academic content of the program is worthy of BTech in "Computer Science and Engineering", and CSE is indeed a more representative name for this degree than IT.
- This change be done immediately, starting from the first batch (2008 batch) itself to avoid the situation of having a few batches with IT degree and the rest with CSE.

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BTech (ECE) Curriculum: Concept Document, Dec 2011
(ECE: Electronics and Communication Engineering)

Background

IIIT-Delhi's objective is to become a globally respected Institution for research and education in IT and allied areas. Information Technology is a broad area which uses Computing and Communication technologies to solve problems. The two major disciplines to nurture these are Computer Science and Engineering (CSE) – which covers computing science and its applications, and Electronics & Communication Engineering (ECE) – which covers science and engineering of communication technologies and computing systems.

Our distinctive vision – which we believe will ultimately set IIIT-D apart in educational and ultimately reputational/brand-name terms – is how we propose to `integrate' the above two fundamental streams to mutual benefit. We fundamentally believe that our technological era is rich with creative opportunities for those who create new applications based on systems integration of existing technology components, in addition to creation of new frontiers of engineering knowledge. In order to facilitate the former, cross-training of students across traditional Computer Science and EE boundaries is desirable – for longevity and success in engineering careers. The curricular structure proposed aims to achieve this goal, in addition to incorporating the necessary flexibility for program evolution as well to allow customization by individual students based on their own personal interests.

IIIT-Delhi started with programs in computing science, and plans to now launch its ECE programs. This not describes the overall structure of the B Tech(ECE), and the main courses in the core part of the curriculum.

Program Objectives
- To produce students prepared for Indian industry with necessary initial skills to enter and succeed in a long-term engineering/entrepreneurship careers (post B.Tech), and
- Ready for PG studies and research careers

Some General Guidelines
- It is desirable to have the first year program which is common with CSE – this will allow flexibility to students in moving from one to the other.
- After the first year common program, the second year program can be relatively fixed, comprising mostly of core courses for the program. 3rd year onwards the program can be mostly flexible comprising of electives, which may be organized as streams. This will make the structure similar to that of the current CSE program.
- Flexible course options (electives) in the 3rd and 4th year allows students control over choice of specialized 'tracks' in accordance with their interests; in conjunction with 4th year projects and design oriented classes, we believe that it provides the necessary depth and broad systems-centric educational experience for long-term success in the emerging cutting-edge industries in India (electronics design, high end manufacturing, communication and networking among others) as well as preparing them for graduate study.

ECE Program Structure

Common 1st year for both EE and CS/IT degree Student

An exercise was done earlier to identify a common program for the first year for CSE/ECE students – the common first year program is given below. Each of the two semesters, all students do one course each in maths, software, hardware, systems/practice, and HSS/Commn.

	Sem 1	Sem 2
Hardware	Digital circuits	Computer Organization
Software	Intro to Programming	Data structures and Algos
Systems/Practice/Engg Sci.	System Management	Electronic circuits
Maths	Math 1 (Complex variables, Differential equations)	Math 2 (Probability and Statistics)
Communication Skills / HSS	Com 1	HSS 1

Core Courses for ECE in 2nd Year (and 3rd Year)

In 3rd and 4th semesters, the course load will be same as in CSE – 5 courses, including one HSS/Communication skills. (In CSE, one of the slots is used for "Engineering Science elective" in each semester – the ECE courses are likely to be made available to CSE students for their Engineering Science slot.) In addition to the core courses in 3rd and 4th semesters, there is one core course in 5th semester also (CSE also has one). The following structure is proposed for ECE:

Sem 3	Sem 4	Sem 5
Integrated Electronics	Principles of Communication Systems	Fields and waves
Operating Systems	Signal processing	
Signals & Systems	Embedded Systems	
Math 3 (Linear Algebra)	Math 4	
Com 3	HSS 4	

I.e. List of Compulsory Courses to be covered in these semesters are:
- **Sem III**: Integrated Electronics, Signals and Systems, Operating Systems (same as CSE course), Math 3 (Linear Algebra), [5th course will be Communication Skills]
- **Sem IV**: Principles of Communication Systems, Signal Processing, Embedded Systems, Math 4, [5th course will be HSS]
- **Sem V**: Fields and waves

Program Structure in 3rd/4th Years, and Graduation Requirements

A program similar to that of CSE can be followed, if possible. The main aspects of the program are:

- For a BTech (ECE), a student has to do 9 courses in each of these two years. That is, for graduation, the number of credits required is 4 * 38 = 152 credits (a total of 38 courses of 4 credits each – 10 courses each in first and second years, and 9 courses each in the final two years.) However, a student may also graduate with honors, which requires additional 12 credits (equivalent of 3 more courses.) (The idea is to allow "challenge" the bright student, but not overload the average student. Also, as the full time load is 5 courses, it allows upto 2 backlogs to be cleared without taking an overload.)
- There is a compulsory course "Technical Communication", typically done in 6th semester.
- The HSS requirement is same as in CSE – i.e. three courses (i.e. 12 credits).
- Streams – In the last two years, various streams will be offered. A stream is a set of courses in an area, and a student completes a stream by doing at least three courses of the stream (some streams may require at least four courses). Streams allow the student to focus on some area of ECE – as ECE is too diverse it is not possible for a student to gain a decent mastery in all. Streams allow the student to focus on a chosen area to gain a level of depth, and gain some understanding of other areas by doing some courses from other streams. A student will be strongly encouraged to ensure that at least one stream is completed, though is not required to do so.
- BTech project is optional – but for Honors, it is necessary. BTech project can be taken for equivalent to 2 to 4 courses.

Suggested "Streams" for ECE
Some common streams that are possible are given below. Then nature of streams will evolve with time depending on the interests of faculty as well as relevance/importance of the areas.
1. Signal & Image Processing
2. Communications Systems/Networking
3. Circuits/Electronics
4. Computer Engineering
5. Energy Systems
6. Embedded Systems/Controls

The concept of streams and the courses in each will be evolved later.

Overall Core Program for the BTech(ECE) Program

Sem 1	Sem 2	Sem 3	Sem 4	Sem 5
Intro to Programming	Data structures and	Operating Systems	Principles of communication	Fields and Waves

	Algos		Systems	
Digital circuits	Computer Organization	Integrated Electronics	Embedded Systems	
System Management	Electronic circuits	Signals and Systems	Signal Processing	
Math 1 (Complex variables, Differential equations)	Math 2 (Probability and Statistics)	Math 3 (Linear Algebra)	Math 4	
Com 1	HSS 1	Com 2	HSS 2	

REGULATIONS FOR THE MTECH / PHD PROGRAMS

Change History: Version 1.1 (Jan. 2012): Some changes were to simplify the explanation. Changes to rectify some observed deficiencies are:

- 1 (1). Clarified that in Senate there will be *at least* one student representative.
- 3 (2) Full time and Part-time student is now defined directly as student working full or part time for his/her studies. Further, "a full time student is expected to register for at least 12 credits in a semester". Minimum credits for which a part-time student must register changed to 4.
- 3(3) Clarified, that a full time student may be permitted to become a part-time student towards the completion of the program.
- 5 (1) b. Clarified that a PhD student is not eligible for *teaching* assistantship or scholarship after five years.
- 5 (1) c. Simplified description of Assistantship as sustenance stipend (25% of total), scholarship (25%), and remuneration for academic work (50%).
- 6(2) Clarified that if a student changes his/her program from PhD to MTech then difference in stipends, including difference in tuition fees, will have to be refunded. However, if it is done on the recommendation of PGC, then the student is treated as MTech student from the time of transfer and this refund is not necessary, and the student may be given preference for MTech. Assistantship.
- 6 (4) Migration from MTech to Phd, added: "Such a student, for PhD credit requirement, may be treated as if he/she had joined the PhD program from the start of the PG program. The student may be granted an MTech also, provided he/she fulfils requirements for the same".
- 7 Clarified that registration for student working with an external co-supervisor may register through electronic means.
- 11 Minimum continuing CGPA of 6.0 in MTech program is made uniformly applicable to all students irrespective of TA/non-TA ship., if the CGPA falls below this, then the student may be placed under warning first, and if the performance does not improve, may be asked to leave the program.
- 11 (2) The minimum continuing CGPA in PhD program is 7.0. If the CGPA falls below this, or the student is not progressing well in his/her research, then based on the recommendations of the adviser, he/she may be placed under warning or may be asked to shift to MTech program or leave.
- 13 (1) Normal per semester load for MTech is relaxed to 12 to 20 credits instead of 16 or 20 credits specified earlier.

- 14 (5) b. The following has been added: "Normally, the external co-supervisor should be finalized before the comprehensive and the PGC should be informed by the adviser and the student about the same."
- 14(7) Comprehensive. Clarified that operational details will be informed by the PGC.

GAC Report: MTech + UG TA/RA-ship policies (held on Nov 23rd).

Current Situation:
1. MTech students are awarded TA-ships on a competitive basis upon joining – for 2 years they get 2.5 lakh tuition waiver and Rs 6,000 per month. This amounts to a total compensation of approximately Rs. 4 Lakhs. However, certain TAs were found to be not good once they joined.
2. Moreover, they are required to stay for 4 consecutive semesters – this means that they cannot complete the program in 15 months even if they wanted to (and were capable of doing so).
3. Further, the MTech program is geared towards meeting industry needs, and as such TA-support seems to distract from a student's goal of timely completion of an MTech degree. There was also consensus that the MTech need be considered as a 'professional' degree (rather than preparation for a research career), and hence a student entering that program is expected to be self-financing.
4. There is no exit clause even if TAs don't want to continue, or the GAC considers them academically deficient to be TAs.

In the first two batches of MTechs admitted to IIITD, in the first batch 5/20 were given TAs, and in the second batch 4/35 were given TAs.

Therefore, the GAC (Anirban, Astrid, PK, and Raja) met and recommended the following actions:
1. The constraint that current TAs have of taking classes for 4 consecutive semesters should be eliminated.
2. For an incoming cohort, the first set of TA-ships will be decided by the admission committee of the MTech program. For those students who are offered a TA-ship, increase the amount of TA stipend to Rs. 10,000/- per month and eliminate the fee-waiver. Consequently, there will be no fee waivers offered of any kind.
3. Afterwards, every semester the offer of a TA-ship will be re-evaluated, and PGC will evaluate performance and award subsequent TAships.
4. Award/continuance of a TA-ship requires a minimum CGPA of 8.
5. Allow full-time work (40 hours per week) within IIITD as Research Assistantships as a possibility, with a minimum stipend of Rs 15,000 per month.
6. UG RAs will be treated on par with UG TAs.

These changes are recommended with the goal of incentivizing performance of MTech TAs, and to provide leeway to rewarding MTech students who perform well in admissions test and in the first semester.

Giving Weight to Class XII Marks for Admission to IIIT-Delhi

Background

A key purpose of admission criteria for an Institute is to select from a pool of applicants those students who are best suited for the program, i.e. those who can do well in the program in the Institute. IIIT-Delhi has been studying the effectiveness of various measures for selecting students for the IIITD program.

From the data from past years, using the CGPA of students after first as an indicator of how well the student is doing in the program, we have been studying year the various parameters at admission time for doing well in our program. Some general observations from this analysis are:

- Class XII marks are the strongest predictor of success in the program, with a correlation of about 0.5 with the CGPA. And the average in Class XII marks of students with CGPA above 8.0 and those with CGPA below 6.0 is almost 9% (which is very significant given that all students are above 80%)

- A correlation of 0.36 exists between the entrance test scores and CGPA. And the average in marks obtained in entrance test of students with CGPA above 8.0 and those with CGPA below 6.0 is almost 13%.

- While there is a correlation of about 0.3 between the entrance test scores and class XII percentage, the correlation is virtually nil in the top 200 students.

Proposal – including Class XII marks also for selecting students

The above data strengthens the general wisdom that a multi-dimensional criteria is better suited for selection as compared to an entrance exam (as it can create a "one exam wonder"), and that class XII performance is a good predictor for performance in College and should be included in admission criteria. As our study has clearly shown that students who do well in IIITD are those who have good marks in Class XII as well good marks in the entrance test, we propose that:

For admission to IIIT-Delhi BTech program, 50% weight should be given to class XII marks, and 50% weight to the entrance test marks for Delhi students, and AIEEE marks for outside Delhi students.

In data from another Institute also we observed the pattern that the better performers are those who do well in class XII as well as AIEEE.

It may be interesting to note that even among the students selected, if we rank them according to this new criteria, we find that average CGPA of the top 10 students (at the time of entrance) increases by about 0.5.

The eligibility criteria for admission remains the same – only candidates with more than 80% in Maths and more than 80% overall in class XII are eligible to apply. In AIEEE, as both Paper I and Paper II have Maths, students taking any of the two will be eligible for entrance to IIIT-Delhi. If a student has taken both, he/she can report results of either (presumably the higher of the two).

Like in DU, we plan to take Class XII marks as they are independent of the Board, i.e. there is no "normalization" across Boards. We will follow what DU does for handling different Boards.

Combining XII and IIIT-D's Entrance Test Scores

We take the % marks in class XII – for this we take the total marks overall, divide by the maximum marks, and multiply by 100. Percentage is to be computed to two digits after the decimal, and will be rounded off. Similarly, we take the overall % marks in IIITD's aptitude test. The sum total of the two percentages will be the total marks (out of 200), based on which the ranking will be done. In case of a tie, % in the aptitude test will be used, following which Maths marks in class XII will be used.

Combining XII and AIEEE's Rank/Score

Outside Delhi candidates need not take the entrance test and AIEEE is used for them. As it turns out AIEEE gives the following information to each candidate: All India – overall and category rank, State – overall and category rank, marks obtained and the maximum marks in two papers – Paper I (Physics, Chemistry, Maths), and Paper II (Maths, aptitude, and drawing).

For converting the AIEEE marks to percentage, we use the ratio of marks obtained and maximum marks as provided by AIEEE, and compute the percentage to two digits after the decimal, with rounded off. Then, as above, we add the percentage of AIEEE to the overall percentage in class XII. This total will be used for ranking. In case of a tie, AIEEE rank will be used to break it.

Giving Bonus Marks for "Exceptional Programmers"

Sometimes creative and talented programmers, who do well in programming in school, do not qualify in entrance tests, perhaps because they are not able to spend time in "coaching" for these entrance tests. (This situation is similar to one where an "amateur engineer" who, while displaying engineering bent in school, does not make it to top Engineering Colleges in the country, as the entrance is based entirely on the performance in the entrance test.) It will be great to get these students into the Institute – they are likely to be future entrepreneurs (having followed a "road less travelled" in their school), and are likely to become "star programmers" who can help build innovative systems.

In order to attract these students, it is proposed that an additional bonus marks (say 15%) be given for "star programmers". I.e. the star programmers will get, besides the marks from class XII and AIEEE/Entrance test, additional bonus marks. The following students can apply for these bonus marks:

- Those who have been selected in the Indian National Olympiad in Informatics (INOI) for the training camp held for selecting the Indian team for International Olympiad in Informatics (IOI). (About 25 students are selected across the country for the training camp.)
- Any person who has won a programming contest (contests for quiz, web design, etc are not eligible – only programming contests where students have to write programs and evaluation is based on their programming ability are eligible) organized in India or elsewhere in the previous year in which more than 20 teams from more than 20

schools participated. The contest must have a web site which must give sufficient information about the teams that participated, and sufficient technical details about the contest (e.g. the nature of problems given, languages used, etc.).

These students will have to apply along with others, but will have to fill another form for information. All such candidates will be considered by a committee of at least five faculty members (and maybe some external experts). Based on the performance of the student in the contest, and the standing and competitiveness of the contest itself (which will be decided based on the information publicly available on the website of the contest), the committee will assign marks between 0 and Max to these students. These will be considered as "bonus" marks and will be added to the marks obtained through class XII and Admission Test/AIEEE. After adding these marks, merit list will be prepared as before. The committee will do the evaluation and submit the marks before the results are declared. No member of this committee will be involved in tabulation/compilation of the entrance test result.

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BTech-Courses offered in Winter Semester 2012, starting January 02, 2012

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for BTech 2011

CSE102: Data Structures & Algorithms (Dr. Vikram Goyal)
CSE112: Computer Organization (Dr. Subhasis Banerjee)
MTH201: Probability & Statistics (Dr. PK)
ECE101: Basic Electronic Circuits (Prof. RN Biswas)

HSS - Humanity & Social Sciences Courses *(ANY ONE)*

HSS-1	HSS101: Technology and Society (Dr Leon Morenas) HSS207: Human Values and Professional Ethics (Dr. Mukul Sinha)
HSS-2	HSS202: Perspectives on Knowledge (Mr. Levin) HSS205: Introduction to Sociology (Ms. Duru Arun-Kumar)

for BTech 2010

CSE202: Fundamentals of Database Systems (Dr. Ashish Sureka)
CSE222: Algorithm Design & Analysis (Dr. Debajyoti Bera)
CSE232: Computer Networks (Dr. Pushpendra Singh)

(ANY ONE out of the below ESC courses)
ESC202: Digital Communication (Dr. Saket Srivastava)
ESC204: Quantitative and Qualitative Research Methods (Dr.Saket Srivastava, Dr. Mayank Vatsa)

HSS - Humanity & Social Sciences Courses *(ANY ONE HSS Course)*

HSS-1	HSS101: Technology and Society (Dr Leon Morenas) HSS207: Human Values and Professional Ethics (Dr. Mukul Sinha)
HSS-2	HSS202: Perspectives on Knowledge (Mr. NR Levin) HSS204: Psychology (Dr. Arvinder Grover) HSS205: Introduction to Sociology (Ms. Duru Arun-Kumar) HSS206: Introduction to Film Studies (Ms. Párul Tyagi)

for BTech 2008/ Btech 2009/all MTech/PhDs

1. COM301: Technical Communication (Prof. Jalote / Mr. Hemant)
2. CSE342/542: Pattern Recognition (Dr. Richa Singh)
3. CSE344/544: Computer Vision (Dr. Mayank Vatsa)
4. CSE508:Information Retrieval (Dr. Srikanta Bedathur)
5. CSE522: Verification of Reactive Systems (Dr. Astrid Kiehn)
6. CSE524: Theory of Modern Cryptography (Dr. Somitra & Dr. Debajyoti)
7. CSE535: Mobile Computing (Dr. Vinayak Naik)
8. CSE537: Embedded Systems (Dr. Amarjeet Singh)
9. CSE538: Ad-Hoc Wireless Networks (Dr. Sanjit Kaul)
10. CSE539: Cellular Data Networks (Dr. Soshant Bali)
11. CSE606: Data Warehousing (Dr. Anirban Mondal)
12. CSE607: Financial Data Analytics (Dr. Anirban Mondal)
13. CSE645: Digital and Cyber Forensics (Dr. Gaurav Gupta)
14. CSE793-A: Topics in Cryptanalysis (Dr. Somitra Sanadhya)
15. DES301: Exploring Visual Design (Dr. Lalit Das - Guest Faculty)
16. ENT402: Entrepreneurship: Managing a Venture (Mr.Hemant Kumar/ Dr.Pankaj Jalote)
17. ENV301:The Earth System: An Environmental Science Perspective (Dr. Raja Sengupta)
18. ESC504: Quantitative and Qualitative Research Methods (Dr.Saket Srivastava, Dr. Mayank Vatsa)
19. FIN402 : Finance II (Sachin Kakkar - Guest faculty)
20. PHY302: Semiconductors and Optics (Physics-2) (Prof Subhash Chopra)
21. ECO301: Introduction to Economic Analysis (Dr. Shreemoy Mishra)

HSS - Humanity & Social Sciences Courses (ANY ONE HSS course)

HSS-1	HSS101: Technology and Society (Dr Leon Morenas) HSS207: Human Values and Professional Ethics (Dr. Mukul Sinha)
HSS-2	HSS202: Perspectives on Knowledge (Mr. Levin) HSS204: Psychology (Dr. Arvinder Grover) HSS205: Introduction to Sociology (Ms. Duru Arun-Kumar) HSS206: Introduction to Film Studies (Ms. Párul Tyagi)

Proposal to start an MTech Specialization in Mobile Computing

Overview of the program: Mobile phones have emerged as truly pervasive and affordable Information and Communication Technology (ICT) platform in the last decade. Large penetration of cellular networks and availability of advanced hardware platforms have inspired multiple innovative research opportunities in the domain of mobile computing. Although mobile phone over the years have improved significantly in terms of CPU, memory, communication bandwidth, and energy, there are still constraints that exist in each of these areas leading to these phones requiring different operating systems and programming languages as compared to those running on regular PCs. The phones can further augment their capabilities using multiple services that are now available either on the web or in the cloud. For appropriate usage of such services, an understanding of middleware architecture is required to suitably call the APIs of these services and extract the corresponding results. Design and development of next generation mobile applications, therefore require an in depth understanding of different communication technologies for different bandwidth, range, and energy requirements, middlewares, mobile OS, mobile hardware constraints, and interface of external devices with mobile phones. Currently, there does not exist any post-graduation program that teaches these advanced topics in mobile computing and networking and prepare students for the new challenges in this upcoming domain.

In the mobile computing and networking MTech program, we will cover both theory and practice required to design and build applications for mobile-based services. The program will focus on developing hands-on skills pertaining to the latest and most popular platforms, e.g. Symbian, Android, Maemo, etc. Students will gain knowledge in wireless technologies, such as Bluetooth, WiFi, GPRS, EDGE, 3G, LTE, 4G, etc. They will be trained not only to use existing mobile platforms but also to build new ones. Projects will be an integral part of all the courses. Advanced courses in other allied domains such as information security and biometrics will help prepare students for some of the future areas in mobile computing for e.g. possible security attacks and defence mechanism in the mobile domain.

Main faculty in the program: The following faculty will be primarily offering the courses and guiding thesis and papers.
- Amarjeet Singh
- Pushpendra Singh
- Sanjit Kaul
- Soshant Bali
- Vinayak Naik

Courses in the program: Students enrolled in the program will be assumed to have the basic understanding of Operating Systems, Object Oriented Programming, and Computer

Networks. Following is a list of courses currently planned to develop the necessary skills as mentioned above in the students selected for the program

- Monsoon semester
    - Distributed Systems Security (systems) The aim of this course are to study the fundamental characteristics of distributed systems, including their models and architectures; the implications for software design; some of the techniques that have been used to build them; and the resulting details of good distributed algorithms and applications.
    - Embedded Systems (systems) Starting with motivation from several real world embedded hardware and software platforms being used across diverse application domains including sensor networks, robotics and mobile computing, we will develop deeper understanding of associated issues for embedded systems such as scheduling, real time communication, power aware designs and constrained memory and computation resources. The course will be primarily project based in which some hardware platforms will be made available for doing embedded programming. For the initial few years, the theme for the projects will be related to Cyber Physical Systems.
    - Mobile and Cellular Network Security (systems) Cellular phones and their supporting networks now represent the most widely available computing and communications technologies. The number of user of these networks outnumbers the number of users of conventional desktops and laptops. The objective of this course is to understand how these systems function and the security challenges facing them. This course provides an in-depth investigation into security issues in areas including cellular air interfaces, core networking (SS7, IMS), cellular data networking, and mobile device architectures. The course will focus more on security aspect of technologies including GSM, CDMA and futuristic LTE.
    - Advanced Computer Networks (systems) TBD

- Winter semester
    - Mobile Computing (systems) A mobile phone is constrained in terms of CPU, memory, communication bandwidth, and energy as compared to PC. Therefore, phones require different operating systems and programming languages. Given the plethora of web-based services, a phone can augment its capabilities by downloading some of its tasks to those services. In order to use those services, there is a need of a middleware to call APIs of the services and get back the results. There are different communication technologies for different bandwidth, range, and energy requirements. A user of the mobile phone can select among these depending upon the requirements. Similarly, depending upon accuracy and energy requirements

there are different localization technologies. As system on a phone is getting complex and its usage is increasing, there are security attacks on a phone. In the mobile computing course, we will cover both theory and practice required to develop secure mobile phone-based services.

- Cellular Data Networks (systems) This course will introduce senior level undergraduates and graduate students to fundamentals of 3G and 4G cellular data networks. We will explore mechanisms like scheduling, paging, handovers, and mobile IP that are used by most cellular networks. Algorithms for commonly deployed 3G/4G middle boxes will also be discussed. These middle boxes include deep packet inspection systems, TCP optimizers, session border controllers and intrusion detection systems. The course will also introduce the next generation IMS based voice over IP architecture. Students will be required to complete one hands-on group project on a topic relevant to the course.

- Ad Hoc Wireless Networks (systems) The course will start with a brief introduction to different applications and their requirements in terms of typical metrics of interest like throughput and delay. Having motivated applications, we will briefly learn about the wireless channel and physical layer (OSI layer 1) technologies, with emphasis on their abstractions that are relevant to understanding OSI layers 2 and above in wireless networks. We will next learn medium access techniques that a distributed network of nodes (for example, a network of vehicles or sensors in a field) can use to share the wireless medium. Examples of techniques that we will cover include ALOHA, carrier sense multiple access (CSMA) and polling. We will also study CSMA as found in WiFi networks (802.11) and learn about the hidden node and exposed node problems and their solutions. Our journey through various layer 2 techniques will be followed by an introduction to routing techniques that are used in ad hoc networks, for example on-demand and geographic routing. Time permitting, we will also look at the behavior of transport layer protocols like TCP over wireless networks and introduce ourselves to newer paradigms like delay tolerant networking. The coursework will include at least one hands-on project that students will do as part of a group. It may also require students (single or group) to make short presentations on topics related to the course.

- Web-based and Mobile-based Middleware (software) TBD
- Information Communication Technology for development (systems) TBD
- Security threats in Emerging Domains (systems) TBD

Mobile Computing will be a foundational course and would be recommended. Since one can look at mobile phones as embedded system with more powerful computing and memory resources, basic principles of embedded systems to conserve power and increase

the overall system lifetime will be taught in the core Embedded Systems Course. As wireless is an essential component of mobile computing and networking, one of networks-related course is recommended.

Where graduates of this will be desired: According to Gartner, in the first quarter of 2010, customers worldwide bought 314.7 million mobile phones, a 17 percent increase year over year. Smart phones sales specifically jumped 48.7 percent from the year-ago quarter, as 54.3 million units flew off the shelves. Besides applications from mobile phone companies and service providers, third-party application developers can develop and sell applications for most of the smartphones platforms. It is speculated in Aug'09 that only Apple's third-party app store was $200M monthly. Currently, there is no program in India that prepares students to tap into job market for mobile app development. Following is a representative list of companies, which will be interested in the students with knowledge of mobile computing and hence are potential employers of graduates of this program.

- Research labs
  - Nokia Research
  - Microsoft Research
  - Intel Research
  - IBM Research
  - GE Research
  - Samsung Research
  - TCS
  - Alcaent-Lucent
  - LG
- Mobile phone and OS companies
  - Nokia
  - Samsung
  - Sony Ericsson
  - Google
  - Microsoft
  - LG
- Telecommunications
  - Ericsson
  - Huawei
  - Tellabs
  - Nokia Siemens Networks
  - Cisco
  - Juniper
  - Alcatel-Lucent
  - Samsung
- Companies that develop mobile-based services and applications
  - Wirkle Technologies Pvt. Ltd.
  - Aricent

- - DIMTS
  - Airtel
  - Sasken
  - One97
  - Infosys
  - Wipro
  - Mobikwik
- Wireless
  - AirTight Networks
  - Qualcomm

Further we also believe that the graduates of this program will have a good foundation that will aptly prepare them to start their own ventures in this new domain that shows a lot of promise in the future.

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