

Office of the Dean Academics

Minutes of the Fourth meeting of Postgraduate Curriculum Review Committee

December 11, 2013

The fourth meeting of the Postgraduate Curriculum Review Committee (PG-CRC) was held in the Board room at 1100 hrs on November 14, 2013, and adjourned meeting was held on December 5, 2013 at . The following members were present:

(Italics indicate inability to attend).

14.11.13: Prof. Anurag Sharma, Prof. Bhim Singh, *Prof. Naveen Garg*, Prof. B. Bhattacharjee, *Dr. B.P. Patel*, Prof. P.M.V. Subbarao, Prof. V.K. Jain, Prof. D.T. Shahani, *Prof. M.G. Dastidar*, Prof. Maithili Sharan, *Dr. Shalini Gupta*, Dr. Pritha Chandra, Prof. D. Ravi Kumar, Prof. Joby Joseph, Prof. M.R. Ravi.

5.12.13: Prof. Anurag Sharma, Prof. Bhim Singh, *Prof. Naveen Garg*, Prof. B. Bhattacharjee, *Dr. B.P. Patel*, *Prof. P.M.V. Subbarao*, Prof. V.K. Jain, *Prof. D.T. Shahani*, *Prof. M.G. Dastidar*, Prof. Maithili Sharan, Dr. Shalini Gupta, Dr. Pritha Chandra, *Prof. D. Ravi Kumar*, Prof. Joby Joseph, Prof. M.R. Ravi. Prof. Alok Madan from Civil Engineering also attended.

The following items were discussed.

1. Confirmation of minutes of first meeting dated 5.2.13

Minutes of the previous meeting dated February 5, 2013 were confirmed as circulated.

2. Discussion on the Minutes of the M.Tech. Curriculum Workshop held on 7.10.2013:

A workshop on M.Tech. Curriculum was held on October 7, 2013, and the agenda paper and minutes of this workshop are given in Annexure A. The main agenda of this meeting was to discuss these minutes in the PG Curriculum Review Committee and prepare an approach paper. The minutes were discussed in detail itemwise. The following summarizes the recommendations arrived at by the committee after these deliberations.

i. S-component to account for self-study in PG courses (L-T-P-S structure):

The PG-CRC had proposed in its earlier meetings to include an S-component to the PG courses since these courses should expect a lot more effort from the students per contact hour as compared to UG courses. Also, these efforts should reflect in the credits given to the course, which means the number of credits for a PG course should reflect the actual effort expected from a student rather than classroom contact hours alone. However, when this suggestion was circulated to Departments, none of the feedbacks received favoured this suggestion, although few Departments responded. Neither did the faculty members present in the workshop on October 7 support this proposal. It was therefore recommended that:

“There would be no S-component introduced in PG courses. However, the meaning and scope of the P-component could be expanded to include the additional hours spent by the students on the course outside the classroom, on self-study, term papers, assignments and problem solving, design exercises, etc. The evaluation of material covered by the students outside the classroom contact hours could be accounted for through weightages in non-common evaluations such as quizzes, tests, term papers, assignments etc. or through Minor and Major tests.”

It was also recommended that the Departments should minimize or avoid major overlaps between their UG and PG courses. For all courses, the pre-requisites should be specified clearly for UG and PG students taking the course. Consent of the Instructor should be included as one of the options for pre-requisite of a course, to enable course coordinators to permit specific students to take a course based on their judgement of the student's preparedness.

ii. M.Tech. Major Projects:

It emerged in workshop that the research content of Masters' programmes should be increased. Currently the M.Tech. Major project constitutes 18 out of 60 credits, i.e., 30% of the curriculum. The PG-CRC decided to recommend that this be increased to 40%, i.e., 24 credits, and allow various M.Tech. Programmes the flexibility to allocate between 18 and 24 credits to their Major Project. It was also recommended that the option of spanning the project over 2 semesters, one year (2 semesters + summer) or three semesters (second semester, summer, third and fourth semesters). It was recommended however that the final semester weightage should be 12 credits for the project, and the division between the other semesters would be left to the various programmes to decide.

Project Evaluation: The committee discussed extensively about options for project evaluation. The grading options discussed included

- a) Satisfactory / Unsatisfactory grade for projects, with an Excellent grade for distinguishing best projects;
- b) Letter grades for projects using the usual letter grades, or a more granular grading scale (say A, B, C etc.), but project grade not counted in CGPA;
- c) The present method.

Several suggestions about improving the quality of projects were also discussed, which include:

- a) insisting on a tangible metric such as a research paper / patent / product / laboratory setup etc. as project outcome for completion;
- b) Monitoring of projects through the use of a diary / log book of project preferably maintained electronically on a learning management system such as Sakai;
- c) Excellent / A grade to be awarded by a separate committee appointed by the DRC/CRC for this purpose, at Departmental level across programmes, which could, if needed, include members from outside IIT; students should submit a 10-15 page write-up in the form of a paper for evaluation by this committee. It was also discussed if the first level evaluation could be left completely to the supervisor, or it should be done by a committee as is the present practice.

After detailed deliberations, the committee decided to recommend the following:

Evaluation: The PG-CRC felt that in order to keep the student enthusiasm in the project, the project should be graded with letter grades. However, in method of project evaluation, the PG-CRC suggested that the final evaluation of project in the final semester should follow a different procedure while all other evaluations including final evaluations in other semesters should be conducted as it is done at present. In the final evaluation, the PG-CRC recommended that the supervisor should propose a grade, with a maximum of B grade. A committee should listen to the presentation of the student and confirm the grade, or suggests that the grade be changed by one grade up or down. A second committee should then identify those projects which can be awarded an A grade. It was felt that a publication or a patent as a tangible metric for A grade is not feasible owing to the time required for these to materialise. It was decided that the criteria for A grade should be decided and publicised in advance by the DRC/CRC/PEC.

Monitoring: The PG-CRC suggested that the monitoring of projects be done by the supervisor through a diary / log book preferably maintained in a Learning Management System such as Sakai. This log could also serve as a means to evaluate the regularity of the student by the project evaluation committees as well.

- iii. Several members expressed the view that the current process of calling an external examiner from outside IIT for final evaluation of M.Tech projects was not serving much useful academic purpose, and could be scrapped. Dean Academics was requested to take up the matter in Board for Academic Programmes for further decision.

3. **Draft Approach Paper for M.Tech. Curriculum Review**

Based on the discussions in the M.Tech curriculum workshop and the PG-CRC meetings, a draft of the approach paper for M.Tech. Curriculum review was prepared. This approach paper was discussed itemwise in the meeting. The committee members agreed to the paper with minor modifications to incorporate the discussions of the PG-CRC meeting 4 (current meeting). The modified approach paper is enclosed in Annexure B.

The meeting ended with thanks to all the members.

Comments on the above minutes should be sent to the undersigned within one week of circulation of these minutes.

M.R. Ravi
Associate Dean Academic (Curriculum)
and Convener, PG-CRC.

Annexure A
Agenda Paper and Minutes of M.Tech. Curriculum Workshop held on 7.10.13

Curriculum Workshop for M.Tech. Revision
(Monday, October 7, 2013)
Programme
Venue: Seminar Hall

Each Session would have brief presentations of issues for maximum of 15 mins and rest of the session would consist of free discussions and suggestions.

09:30 – 09:45: Opening Remarks
09:45 – 11:00: Session I: Philosophy and Admission Issues
11:00 – 11:30: Tea
11:30 – 13:00: Session II: M.Tech. Project and its Evaluation
- Break-
14:30 – 16:00: Session III: Curriculum Related Issues
16:00 – 16:30: Tea
16:30 – 17:30: Session IV: Summing up

Representative Issues for Discussion in Each Session

1. Philosophy and Admission Issues

- i. Research vs Employment orientation
- ii. Pedagogy different from UG education
- iii. Attracting good undergraduates into the programme
- iv. Admission process: GATE, additional test, interview, etc.
- v. Admissions in both semesters; 3-year programmes; M.Tech-Ph.D prog.

2. M.Tech Project and its evaluation

- i. Accountability: publication, patent, product, etc. as metric
- ii. Grading vs S/Z; open ended until completion with above metric
- iii. 1/2/3 parts for project; summer utilization & monitoring issues
- iv. Compulsory or Optional (Course / Project based programme)
- v. Central Facilities for project execution:workshop/fabrication etc.

3. Curriculum Related Issues

- i. Credit Structure: LTP / LTP-S; Core-Elective components?
- ii. Input from Industry for curriculum?
- iii. Number of lecture courses: intensity? Increase or decrease number?
- iv. Course based / Project-research based programmes
- v. Communication skills / Research Methodology courses
- vi. Teaching Assistantship and Administration:
 - a. TA training and utilization policy
 - b. Monitoring of Assistantship duty and accountability

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Minutes of the Workshop for M.Tech Curriculum

1. Philosophy and Admission Issues

a. Research Vs Employment orientation

This issue was discussed in detail. There was a broad agreement that whether the orientation is towards research or employment, the performance of students in the courses and the quality of M.Tech. project is of paramount importance for them to do well. It was resolved that since any efforts towards improving the research orientation of the M.Tech. programmes would only improve the employability of the students, these efforts would only be advantageous to the students.

b. Pedagogy different from UG education

Faculty agreed that the PG courses should be more intensive as compared to UG courses: it was pointed out that in PG courses the students should be treated as designers or researchers, and the teacher should act more as a facilitator of the learning process, which should primarily be self-learning, in contrast with UG courses where it is more of classroom teaching-learning process. It was recommended that either the practical component could be utilized to add credits that would account for the self-learning component through assignments etc., or a Self-study credit component could be included as suggested by PG-CRC (LTP-S structure), so that the number of credits of a PG course accounts for the number of hours required to be put in by a student per week for the course: this may be necessary since the number of hours of work per week per credit for UG and PG courses cannot be made different, since PG courses also have UG students enrolling in them.

c. Attracting good undergraduates into the programme

Many faculty members expressed concern about the quality of students joining the programmes. Less than 20% of M.Tech students typically come from CFTIs or even Government colleges. The following suggestions were made:

- Like some other IITs, admission of students during their IV year of B.Tech. could be facilitated: they would do their B.Tech. projects at IIT but earn degrees from the parent institutions, and then join M.Tech. programmes.
- IIT should discuss with major PSUs which select students through GATE so that they may allow these students to continue M.Tech. and join them after completing M.Tech.: this would prevent better students from leaving the Institute after joining.

It was reiterated that improvement of intake is a must for improving the rigour of coursework and projects, which in turn is a requirement for improving the research orientation and employability of our M.Tech. students.

d. Admission process: GATE, additional test, interview, other processes

This item was not discussed.

e. Admissions in both semesters; Three-year programmes; integrated M.Tech-Ph.D programmes

Admission in both semesters was discussed: it was observed that there are issues pertaining to:

- i. difficulties in synchronizing the course scheduling so that the courses need not be offered separately for I semester admission and II semester admission,
- ii. the likely deterioration in quality of students left over after I semester admissions

2. M.Tech Project and its evaluation

a. Accountability: publication, patent, product, etc. as metric

This issue was debated in detail in practically all the sessions of the workshop. While it was agreed that a metric of this kind is desirable, it is not practical to legislate for such a metric owing to the time periods required to get a paper or patent accepted. It was decided to recommend that such a metric could be mandated for eligibility for project awards, or for “excellent” or A grade award, but not for completion of degree requirement.

b. Grading vs S/Z; open ended until completion with above metric

After extensive and passionate discussions on this issue, two options were recommended:

- i. Project should be graded as Satisfactory or Unsatisfactory, and the student should be allowed to continue beyond the stipulated time limit in case the project has not reached the level of satisfactory grade. The supervisor should decide whether the project has reached the level of completion for satisfactory grade. A third grade called "Excellent" could be made available, to which the supervisors could nominate the projects of their students, and the DRCs institute a mechanism to identify and select projects for this grade from among the nominated ones. One of the methods recommended for such selection is that the student should be asked to submit a 10-15 page technical paper about his/her project which could be reviewed by internal or external experts. Only such projects selected for Excellent grade should be eligible for project awards.
- ii. Project should be graded using a less granular letter grade, say A, B, C etc. and the project grade should not be included in the CGPA but separately stated in the transcript and provisional certificates. Here again, the A grade should be awarded using the approach similar to that for Excellent grade in item i) above, while the other grades can be awarded by project supervisors directly when the project reaches satisfactory level of completion. As stated above, the students should be allowed to continue beyond the stipulated time limit in case the project has not reached the level for award of a grade. Incomplete projects should not be graded.
- c. **One / two / three parts for project; summer utilization and monitoring issues**
After detailed discussions, it was recommended that the Minor Project should not be mandated for inclusion with the Major project, but the choice should be left to Departments. Regarding Major project, opinions were expressed in favour of both options: to evaluate the entire Major project as a single unit as is done for MS (Research) presently; or to evaluate and grade the project in two parts as is the present practice for M.Tech. projects. The decision in favour of one option or the other would also depend on the option of grading chosen in item b above. It was also recommended that project evaluation must also include continuous monitoring on Project management or learning management software such as Sakai, where the students should mandatorily log their weekly work regularly throughout their project duration.
- d. **Compulsory or Optional (Course / Project based programme)**
The faculty present in the workshop were unanimous in agreeing that M.Tech. programmes must include a project, and rejected the proposition of course based M.Tech. programme.
- e. **Central Facilities for facilitating project execution: workshop/fabrication etc.**
It was resolved that this is an issue of paramount importance. However since this workshop is not a forum to solve this problem, the resolution was made to forward to the appropriate forum for decision.

3. Curriculum Related Issues

- a. **Credit Structure: LTP / LTP-S; Core-Elective components?**
It was widely agreed that the PG courses should be conducted differently from UG courses, where the faculty member acts as a facilitator for the design / research process the student goes through by self-study, assignments, etc. In UG courses, 1-2 hours outside the classroom is the expected work per lecture hour. However, in PG courses it must be at least 3 hours outside classroom per lecture. In order to account for this with the same meaning of credits as in UG courses (since UG students are also allowed to take PG courses), it was recommended that this additional time may be allowed for by adding credits either as Self-study credits (LTP-S) as recommended by PG-CRC, or by adding credits to the P component. The latter would mean that the P credits would need to be expanded in scope to mean self-study hours or Laboratory component in PG courses.
- b. **Input from Industry for curriculum?**
Once the PG-CRC discusses the outcome of this workshop, the white paper for M.Tech curriculum revision can be prepared. Using this, when the Departments formulate the M.Tech. curriculum, they could take Industry feedback as required. Unlike UG curriculum, Industry feedback for PG curricula need to be programme specific.
- c. **Number of lecture courses: intensity? Increase or decrease number?**
This was discussed in detail. Opinions of individual faculty was sought on this issue. It emerged that leading Universities of America, Europe and Asia have much fewer courses for Masters' programme, and each course is quite intensive in terms of student efforts. While most faculty preferred to limit the number of courses to 3-4 per semester, Civil Engineering faculty mentioned the current number of 6 courses per semester is working well for their students. Going by the need for at least 3 hours of work

other than classroom per hour of lecture, accounting for 8 hours of TA work per week, a weekly schedule of 54-60 hours of academic work expected out of a student would translate to 4 three-lectures/week courses per semester, meaning $4 \times 3 \times (1+3) + 8 = 56$ hours per week. This indicates a need to decrease the number of lecture courses in most M.Tech. programmes of the institute.

This would also mean that each 3-lectures/week course should have 4 credits, making the credits per semester as nearly 16. It was thus recommended that each semester could carry 15 credits, totaling to 60 in a 4-semester programme.

d. **Course based / Project-research based programmes**

Course based programme was not favoured by any of the faculty members present in the workshop. On the other hand it was insisted that the credits for project work should be increased as a larger fraction of the programme as compared to the present 30%. It was recommended that project should carry 40% of the total credits, amounting to 24 credits out of 60.

e. **Communication skills / Research Methodology courses**

This aspect was recognized as an important one. Amongst the Central facilities, it was recommended that language lab and software for language ability enhancement be expanded and made available to PG students as well. Technical communication and research methodology courses handled centrally is not working well for Ph.D. students as of now. It was recommended that these aspects could be handled at the Department level for M.Tech students as of now.

f. **Teaching Assistantship and Administration**

i. TA training and utilization policy

ii. Monitoring of Assistantship duty and accountability

Several suggestions were made for making the TA program effective:

- It was suggested that TAs be assigned to faculty so that close monitoring is feasible. If the same TA is associated with a given faculty member, it is not easy for the student to escape work, owing to familiarity.
- Registration for TA-ship as a course with weekly log entry by student on LMS for monitoring
- Based on log or absence, if a TA is found to miss duty, cumulatively when this amounts to one month, one month's assistantship could be deducted.
- For those students who lose assistantship due to poor performance: two options suggested: disconnect academic performance from assistantships, and award them on the basis of performance in TA work; or provide a living allowance to those who miss out on assistantship for academic performance deterioration.

Annexure B
Draft Approach Paper for M.Tech Curriculum Review

Issues

The following issues pertaining to curriculum were identified by wide consultations through a M.Tech. Curriculum Workshop and detailed discussions in the PG Curriculum Review Committee:

1. Preparedness of input leading to difficulty in setting an appropriate level of courses.
2. Difference in pedagogy of UG and PG courses; enhancement of self study content
3. Reduced level of research content in the curriculum; expectation from a project
4. Project monitoring and evaluation
5. TA work streamlining
6. Credit structure

Problems:

1. *Preparedness of input:* There are two types of M.Tech. programmes: one which constitutes further specialization of the undergraduate education, and the other which is multidisciplinary, and thus is loosely related to the undergraduate education or requires input from a wide variety of disciplines. In the first case, often it is argued that the level of education at the UG level is poor and hence, some 'UG' level courses have to be included again in the PG curriculum. This leads to lowering of the level of PG courses which is not desirable. On the other hand, in the second type of programmes where the background is not built up at the UG level for the PG programme, courses that build the background have to be included before advanced level courses can be taken up.
2. *Reduced level of research content:* Over the years, the quality of M.Tech. projects has gone down. Projects have become time-bound rather than goal-bound. The project are often not resulting in any tangible outcome in the form of a paper or a patent. It is expected that a project should lead to a significant research, a product or a process. One reason often advanced is that the number of students has increased leading to this state of affairs.
3. *Project monitoring and evaluation:* There is often a complaint from faculty that the students are not regular and are not taking the project work seriously. Further, most projects are not hardware based. There are also many problems with evaluation of project, such as the role of supervisor vis-à-vis the evaluation committee and the type of evaluation- graded or non-graded.
4. *Difference in pedagogy:* PG students are more mature as compared to UG students, and it is expected that they should be able to do a significant amount of self inquiry and self study. However, the curriculum has to provide enough opportunity and direction for this to happen. This would require a somewhat different approach to the design of courses for the PG level. The PG students should be trained in report/paper writing even before they write their project report.
5. *TA work streamlining:* All M.Tech. students have to put up to 8 hours/week of TA work in lieu of the assistantship they are given. This is thus a very large technical manpower that is available to the faculty; however, due to inadequate planning and organization at the faculty/department/institute level, this manpower is underutilized. Also in the first and the second semester, the course load, often, leaves little time for TA work.
6. *Credit Structure:* Credit structure should provide ample flexibility to accommodate variations in various programmes.

Proposals:

1. *Preparedness of input:* Each programme should consider a desirable level of preparedness of input students and should set the level of courses in that programme. There should be no courses for which are at the level of the degree programme which the students are supposed to have done.

Each course may prescribe a set of online courses (e.g., NPTEL) or other online material which the admitted students are supposed to know. This should be specified at the website of the course/programme. If the course has input from multiple streams, there may be a one/two courses, as bridge courses, which the students could do as electives in the first semester to bring their knowledge in the relevant subject up to the desired level. However, these course should be specially designed for this purpose and should be run independently for this purpose only, and not merged / combined with one of the existing UG courses. Further, in each course in the first/second semester, a background reading material should be specified, so that the students who have weaker background in the specific subject could read on their own during the intervening vacations and during the semester. The important thing is that the courses in the M.Tech. should be at a higher level, so that good students have enough of challenge and are kept sufficiently engaged.

2. *Reduced level of research content:* An M.Tech. at IIT Delhi should have significant research content. The project component (at present 30%) which is expected to be entirely research, design and development based, needs to be strengthened and probably increased. Further, the project should have a tangible outcome in the form of a paper or a patent (or some other form of IPR). For this to happen the students have to have enough time to prepare, plan and execute the project. Some of the measures that can be taken are: (a) the project duration (2-3 semesters) and credits (18-24) can be increased. (b) A requirement of a tangible outcome can be stipulated.
3. *Project monitoring and evaluation:* Once a project is allotted to the students, its progress and regularity of the student have to be monitored. It may be a good idea to have a project logbook (physical or electronic) where the progress of work as well as meetings with the supervisor and the advice given by the supervisor are recorded. This logbook should be part of the project evaluation process. Project also has to be evaluated periodically. We may continue with the current practice of two evaluations per semester. For an A grade the project must have a tangible outcome, e.g., in the form of a research paper / patent etc., as specified by the DRC/CRC/PEC and publicised in advance. The supervisor should propose a grade for the project, not exceeding B grade. The regular evaluation committee would evaluate and confirm the grade, or recommend revision by one grade up or down, and make a recommendation for consideration for an A grade if the project meets the specified criteria. A separate committee would subsequently examine the projects for the award of A grade.
4. *Difference in pedagogy:* Design of courses must take into account the fact that the students are mature and have already done first/second degree. It is expected and should be considered in the course design that these students can do self study. The time schedule for PG courses and course credits should also account for the work expected from the students. They should also be required to write more term papers/assignments. In fact the report writing skills should be honed during the courses rather than leaving it for the project. It should be mandatory for the student to check these submissions through anti-plagiarism software. The format for preparation of these should also be specified.
5. *TA work streamlining:* We have large number of students as technical manpower being supported by the Institute Assistantship; however, due to lack of planning these are not being utilized properly. On the other hand the faculty members have to carry out a number of routine jobs as part of their teaching/research/administrative commitments. We should make a comprehensive effort to utilize the manpower for reducing the burden on faculty. We should identify the kind of jobs that can be offloaded to the TAs. This can be done at the Institute level as well as at the academic unit level.
6. *Credit structure:* The total credits for an M.Tech. programme would remain 60 with following break-up:

Programme Core:	min 36 (project: min 18 max 24)
Programme Electives:	min 9

Open Electives:	min 6
Total:	60

The Programme electives are chosen out of a list of courses specified by the Department / Centre / School. The open electives are chosen by the student from across the institute, and these could also be from the list of programme electives. Major project out of the core could be 18, 21 or 24 credits. It could be spread over 2-3 semesters and summer, with the break-up of credits between semesters as specified by the academic unit. In case of 18 credits, it could be 6+12 or 3+3+12 while in the case of 21, it could be 3+6+12 or 9+12 and in the case of 24, it could be 6+6+12 or 3+9+12. The last semester, since there is only project to be registered, it must be 12 credits (the minimum credits in a semester). The summer semester after first year could also be made a registered semester with some credits associated with the project.