

Report of the
**EE DFB Subcommittee to review Major/Minor Project and
Independent Study courses (UG and PG)**

Members: *Sumeet Agarwal, Sumantra Dutta Roy, Seshan Srirangarajan, Kushal Shah,
Shaunak Sen, Abhisek Dixit, Ramkrishan Maheshwari*

(Meetings held on 18.10.16 and 11.11.16)

The committee discussed four broad themes. Point-wise thoughts and recommendations pertaining to each of these are presented below.

- **Plagiarism**

- The committee recommends mandatory submission of Turnitin reports with all theses; with a guideline that the similarity score should not normally exceed 15%. (Based on careful manual examination of ~50 M.Tech. theses by SA, this seems the most appropriate threshold: below 15% score most theses were OK, but above 15% score the majority (~75%) contained some plagiarism.) This threshold should only be indicative, and the final judgement/responsibility should be the supervisor's.
- The committee recommends that an introductory session be organised by the respective coordinators every year for students starting their BTP/MTP. This could cover the ethics of research and technical writing, making the students better aware of what constitutes plagiarism; more generally, the session could also be used to introduce students to the motivation and goals of doing a BTP/MTP, as well as some guidelines on how to present and communicate their work.

- **Fairness in evaluations**

- We recommend smaller and more focused and relevant evaluation committees (typically, supervisor + 2 experts in the area): for the BTP evaluations and the EEE/EET/EE5/JTM evaluations, we have already been experimenting with this kind of scheme for the last couple of years.
- We recommend a specified set of criteria to be used to grade projects. The following are some criteria that could be considered:
 - How well the problem has been defined (the focus should be on the technical challenges therein)
 - How well the initial feasibility has been demonstrated

- To what extent results or other outcomes have been demonstrated, and how much novelty these contain
 - How clearly the work has been presented
 - (For BTP Part II and MTP evaluations): To what extent is the work leading towards a product/prototype/patent/paper, depending on the nature of the project?
- Regarding the formula which is used to combine supervisor, committee, and reader evaluations: It has been noted that in some cases, there can be a substantial discrepancy between the supervisor and committee grades, and this can potentially lead to unfair evaluations, as the committee grade is more susceptible to noise. We suggest a slightly more flexible approach, via formally specifying that the formula is 'advisory', and leaving it up to individual evaluation committees to discuss specific cases as needed (especially cases where supervisor and committee assessments are substantially different).
- We suggest that Independent Study, Minor Project, and Design Project evaluations be done via poster, to make them faster and more interactive. BTP award evaluations can also be done this way, and perhaps advertised more widely to the whole Institute, as a means of showcasing the best work being done by our undergraduates.
- Regarding format/guidelines for theses: We suggest that the BTP and MTP Part I reports be changed to a shorter 4--6 page IEEE article format, since the amount of work done is typically not substantive enough to produce a longer 'thesis', and pressure to produce one may be one of the factors leading students to plagiarise. For final Part II theses, it would be desirable to have a fairly well-specified format and set of requirements/expectations.
- **Assignment of students to supervisors**
 - We would like to propose a system whereby specific project topics are floated by faculty members each year, and students can apply against these topics (giving a preference ordering). A simple online interface can be set up for this, where the faculty members are allowed to make a choice of students (in case any of their projects is oversubscribed) based on CGPA or other relevant criteria.
 - It would be desirable to have a half-day 'outreach session' sometime in March/April for the pre-final year students, where the participating faculty members could give brief presentations on their proposed research topics.
 - In case not all faculty members are keen to participate in such a system, it can at least be initiated for those interested, and others can continue to take students as they do at present.

- Students should also be given the option to propose their own topics via the above system, for the consideration of relevant faculty members.
- In order to ensure an equitable distribution of students across faculty members as far as possible, we suggest a cap of 3 or 4 students per faculty member per programme at any given time. ('Programme' here is used to refer to both M.Tech. programmes and B.Tech. programmes.)
- **Quality of work, synergy with the Department's broader research goals**
 - We suggest that groups of more than 2 students should be strictly disallowed for all projects (BTP/IS/Design). This is already indicated in the Institute's Courses of Study document, but has not been implemented universally.
 - Floating of project topics should be done to align with some identified research priorities (including cross-disciplinary ones), so that the distribution of students across areas roughly reflects our broader research agenda.
 - For students who are struggling at mid-term evaluations, we suggest that some mechanism be considered to send them a clear message and also to offer them some sort of assistance to enable them to complete their project. The primary role here should of course be the supervisor's, but in addition it may be worth considering associating such students with a more senior research student who can assist them on an ongoing basis.
 - Research is not everyone's cup of tea; we suggest that the Department should aim for and encourage the floating of a broader range of developmental projects, especially for BTP Part I. Research-intensive projects could be only for selected students, especially at the undergraduate level.
 - To encourage more students to take up BTP Part II, we recommend looking into the possibility of providing some sort of assistantship to students opting for this.
 - We recommend that the Department should seek to define some metrics by which to assess the success of these project-based curriculum components as a whole, and also of the specific recommendations being made here. For instance, the number of papers or patents coming out of BTPs/MTPs; the fraction of students registering for BTP Part II; the number of projects being nominated for awards; the number of successful student-led ideas; the feedback on project courses from both students and faculty. All of these can be monitored over time to judge whether specific interventions in the way these project courses are run are having the desired outcomes or not.