

INDIAN INSTITUTE OF TECHNOLOGY, ROORKEE

DEPARTMENTAL REVIEW TEMPLATE

1. Name of Department/Center: *Civil Engineering Department*
2. Reviewers :
Prof. S.K. Bhattacharyya
Prof. P.K. Sikdar
3. Date of Review: *6-7 April 2014*
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GRID FOR ASSESSMENT

NOTE:

- i. Please grade in the box provided for the following parameters in the range of 1-10 with 10 being the highest.
 - ii. Leave 'blank' for 'No Comment'.
 - iii. Kindly give your opinion on the strength and weakness of the Department/ Center and your suggestions for future growth.
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I. ACADEMICS



I.1	Undergraduate	Score
1.	Curriculum i. Curricular Structure ii. Course Syllabi iii. Flexibility	7
2.	Formal Academic Load on Students i. Teaching ii. Laboratory/Practical iii. Projects(minor/major)	8
3.	Evaluation Process i. Continuing Evaluation ii. Mid-term Evaluation iii. End-term Evaluation	9

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4.	Academic Ambience	8
5.	Opportunity for Peer-Based Learning	7
6.	Opportunity for Further Learning(Breadth and Depth) i. Elective Courses Specialization ii. Minor with Major Discipline iii. Honors Programme in Major Discipline	7
7.	E-Assisted Learning i. Availability of Library Resources and Major Search Engines (like Scopus, Web of Science) ii. Multi-Media Assisted Teaching	7
8.	In –Curriculum Research/Exploration Opportunity to Students	6
9.	Technical Societies/ Colloquium for Students i. Departmental Society ii. Student Chapter(s) of Professional Societies	6
10.	Faculty –Student Interaction	7
11.	Faculty Mentoring of Students	8
12.	Faculty Advisor System for Students/Class of Students	11
13.	Self Study Courses for Student	11
14.	Effective Teaching Mechanism for Enhanced Number of Students in Various Classes	8
15.	Effectiveness of Assisted Learning: Tutorial System for B.Tech Students/ Seminars	8

I.2	Graduate Programmes (Masters)	Score
1.	Curriculum i. Curricular Structure ii. Course Syllabi iii. Flexibility	7
2.	Formal Academic Load on Students i. Teaching ii. Laboratory/Practical iii. Seminar/Dissertation	8
3.	Evaluation Process i. Continuing Evaluation ii. Mid-Term Evaluation iii. End-Term Evaluation	9
4.	Academic Ambience	7
5.	Opportunity for Peer-Based Learning	7
6.	Opportunity for further Learning(Breadth and Depth) Elective Courses (Specialization Electives)	7
7.	E-Assisted Learning i. Availability of Library Resources and Major Search Engines (like Scopus, Web of Science)	7



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	ii. Multi-Media Assisted Teaching	
8.	In –Curriculum Research/Exploration Opportunity to Students	8
9.	Technical Societies/ Colloquium for Students	
	i. Departmental Society	7
	ii. Student Chapter(s) of Professional Societies	
10.	Faculty –Student Interaction	7
11.	Faculty Mentoring/Supervising of Students	8
12.	Faculty Advisor System for Students/Class of Students	8
13.	Effectiveness of Assisted Learning: Home Assignments/Seminars/Presentations	8

I.3	Doctoral (Ph.D) Programmes	Score
1.	Pre-Ph.D Courses and Evaluation Process	8
2.	Comprehensive Courses Examination	8
3.	Breadth and Depth of Knowledge of Students	8
4.	Seminar/ Presentations and Technical Communication	8
5.	Average No. of Research Students/Faculty	9
6.	Average No. of Research Papers of Ph.D Students	7
7.	Average Duration to Complete Ph.D (years)	8

II. RESEARCH

		Score
1.	Research Ambience in the Department	9
2.	Research Awareness among Doctoral Students	8
3.	Competence Level of Doctoral Students for Research	8
4.	Quality of Research	8
5.	Quality of Publications	9
6.	Impact of Publications	8
7.	Relevance of Research to Knowledge Generation	9
8.	Societal Relevance of Research	8
9.	Exposure of Researchers to the International State of Art	7
10.	Student Exposure to Attending Quality Conferences/Symposia	7
11.	Growth in Ph.D Programme	8
12.	Quality of Research Infrastructure	9
13.	Utilization of Existing Research Infrastructure	9
14.	Department Initiative on Faculty Hiring	7
15.	Breadth and Depth of Research in the Department	8
16.	Research Intensity of Faculty Members	8

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Futuristic Areas For Hiring Faculty Members

Needs to hire faculty for all six groups of the Department

Research Areas for Improvement

Would be communicated and to be attached to this report.

Comments (not more than 100 words for each given below)

Strength:

Weakness:

Suggestions for improvement:

III. Departmental Infrastructure

		Score
1.	Adequacy of Class Rooms and Multi-Media Facility	9
2.	Availability of Laboratories	9
3.	Availability of Conference/Seminar Room, etc.	9
4.	Availability of Seating Space for Research Students	9
5.	Availability of Internet Services in Research Labs and Class Rooms	9
6.	Departmental Library and E-Resources	8
7.	Computing Facilities and Software	8
8.	Adequacy of Offices and Furnishing for Faculty	7
9.	Faculty- Student Ratio	9
10.	Support Staff (Technical/Administrative) Adequacy	5

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Comments (not more than 100 words for each given below)

Strength:

Would be communicated and to be attached to this report.

Weakness:

Suggestions for improvement:

IV. Admissions of Ph.D Students

		Score
1.	Intake of Ph.D Students	9
2.	Admission Process	9
<p>Suggestions:</p> <p>(i) Admit more under QIP programme and sponsored candidates</p> <p>(ii) Admit more students at Ph.D. level than what is taken now.</p>		


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V. Outcomes

1.	Placements	Score
	i. Placement of B.Tech/IDD Students	8
	ii. Placement of Masters Student	
	iii. Placement of Ph.D Students	
2.	Average No. of Ph.D.s Awarded per Year	8
3.	Publications per Faculty in ISI Indexed Journals/Year	9
4.	Average Citations per Faculty/Year (Last-Three Years) (Web of Science/Scopus)	—
5.	Recognitions; Awards(National/International) to Faculty/Students	9
6.	Consultancy and Projects	9
7.	No. of Ph.D. graduates who took Academics as Career(Based on Data of Last 5 Years)	—

Comments and Suggestions for improvement:

- (i) More sponsored research projects should be taken than the consultancy projects in terms of fund flow.
- (ii) The issue of placement of M.Tech. students from Geomatics and Building Science groups should be looked into, as they come from different US background.
- (iii) Ph.D. scholars to be encouraged to prepare journal papers. Also, there should be funding arrangement for their attending international conference.

Date: 7-4-2014

S.K. Bhattacharya
07/04/14
(S.K. Bhattacharya)

P.K. SIKDAR
(P.K. SIKDAR)
(Signature of the Reviewer)

(Name and Address of the Reviewer)

Report and Recommendations of
Review of the Civil Engineering Department, IIT Roorkee

Preamble

The oldest technological Institute of the country, the erstwhile 'University of Roorkee', now an IIT has many advantages from its past, and is a vibrant and flourishing academic Institution of the country. The Civil Engineering Department is the oldest among all, and it has the legacy of more than 160 years. The Institute is existing as an IIT since September 2001.

The Review Committee was set up by IIT Roorkee with the following members:

1. Prof. Prithvish Nag, Vice Chancellor, MG Kashi Vidyapeeth, U.P.
2. Prof. P. K. Sikdar, President, ICT Pvt. Ltd., New Delhi
3. Prof. S. K. Bhattacharyya, Director, CBRI, Roorkee

Due to some special reason, Professor Nag could not attend the review committee meetings on 6th and 7th April 2014, and the other two members completed the review.

The Committee had the opportunity to receive and analyse all the data presented to it by the Department, the presentations of six specialisation groups describing the range of teaching and research activities performed by them, and a few special presentations by faculty from different disciplines showing the current research and socially relevant aspects of these. Also, the UG and PG curriculum revised in recent past (during last 2-3 years) were also presented to the Committee. All these were on 6th April 2014. The Review Committee also interacted with the faculty members of the Department exploring facilities and individual research programmes, which was continuous during both the days of the review activities. The Committee visited all the laboratories and extensions (field and semi-field set ups), which are used by the UG, PG and research students of six specialisations of the Department as follows:

1. Environmental Engineering
2. Geomatics Engineering
3. Geotechnical Engineering
4. Hydraulic Engineering
5. Structural Engineering
6. Transportation Engineering

In addition, the Committee had detailed discussion meetings with the non-teaching (laboratory and other administrative) staff, students of UG, PG (M.Tech. and Dual Degree) and Doctoral research levels in separate groups to explore their satisfaction with facilities and academic programmes provided by the Department, all of which were taken up during 7th April 2014. The Committee was given in advance the compiled data in a document called 'Departmental Metrics', which was also perused by the Committee.

After completion of the review activities, the Committee had a brief meeting with the senior faculty members of the Department and the DOFA to hand over the scoring sheet of the Review Format, and detailed written report was to be submitted in a few days time.



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Report of Review for Civil Engineering Department
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Report of Review

Based on the various inputs received during various meetings, laboratory visits and the perusal of the Departmental information, the scores were given in the Review Template, which was handed over to the Head of Department in presence of DOFA. These scores represent the consensus of all the Committee Members arrived at after detailed deliberations. However, as every aspect of the review were not reflected in the template, it was felt necessary to provide additional written report for attaching to the Review template.

The department is performing well in terms of teaching, research, and consultancy activities. However, the Committee felt the need to analyse the strength and weaknesses of the Department, for providing the recommendations for achieving greater heights in all aspects of its activities. Based on the critical review the following are observed:



Strength

- (a) The legacy of a world renowned Institution 'University of Roorkee' is being carried forward.
- (b) The Faculty Members apparently have a good cohesion, including across the specialisation groups in some cases.
- (c) The Civil Engineering profession already has a high level of confidence on the Department/Institute from its erstwhile profile of the University of Roorkee, as Civil Engineering is the oldest Department.
- (d) The Department gets quality undergraduate students through system of JEE
- (e) The Department has state-of-the-art laboratory facilities in some of the areas
- (f) Each of the specialisation groups has large number of doctoral research students

Weakness


- (a) The IITs are supposed to be known for 'vibrant, cutting edge and socially relevant research' apart from quality teaching. IIT Roorkee seems to be in a state, where it is yet to be in the full culture and league of IIT phenomenon.
- (b) Appears to be compromising by carrying the baggage of erstwhile legacy, where IIT level bar had to be lowered, for accommodating all the features and procedures, that was part of erstwhile University.
- (c) Lack of inter-group interactions on research front.
- (d) Less emphasis on externally funded research projects (sponsored research) than consultancy projects.
- (e) Flexibility provided in the curricula gets jeopardised due to lack of adequate number of faculty members, and therefore, less number of electives..
- (f) Serious shortage of supporting technical/administrative staff for operating the Departmental laboratories/administrative activities for teaching and research
- (g) The student-teacher ratio is not at a desirable level, i.e. shortage of teachers
- (h) Civil Engineering Materials and Engineering Mechanics, which are some of the most basic courses for any Civil Engineering student, are missing in the UG curriculum

Apart from the above analysis, the aspects which emerged out of the discussions with the faculty members, supporting staff and the students (UG, PG and Ph.D.) as well as visits to the laboratories, the Committee preferred to record some of the observations and provide the recommendations for the Department to pursue for change/improvement so that the laurels and lustre of the Department is sustained.




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Recommendations**(a) Teaching**

1. The revised UG curricula in force from 2013-14 academic year be relooked into as some deficiencies are observed. The programme does not have courses on 'Engineering Mechanics' and 'Civil Engineering Materials', which are absolutely necessary in a Civil Engineering curriculum. The basic level courses must be taught as core courses and advanced level courses be offered as electives. More flexibility be given to the students for selecting elective subjects across Departments for both major and minor degrees for realistic cross-disciplinary knowledge benefits. The objective of the B.Tech. (Hons) programme be established clearly through the choices of selecting extra courses systematically from the specializations available in the Department. In the interest of giving more flexibility to students, the minor and major projects be allowed to be as per choice of students involving independent thinking.
2. Flexibility for selection of elective subjects at M.Tech. level is also restrictive due to shortage of faculty, and students often find these electives are like compulsory courses. The situation be changed by offering larger number of elective courses in each semester.
3. Industrial visits for both UG and M.Tech. students are always beneficial. Thus, experiences of field problems, including real-world projects, be given through summer training and organized field visits of UG and PG students as part of the curriculum. Such experiences of faculty is also to be integrated in the delivery of the courses, and also through special lectures from industry experts.
4. The quality of teaching and examination should be of highest standard, with no compromise of any kind. In some M.Tech. level courses of some specializations, the teaching is not covering the entire course materials or what all are required to be covered in the subject. The students' feedback on all such matters are to be taken with more seriousness to correct the course content or the teacher appropriately. Wherever possible, the student must be able to see the effect of their evaluation of course/teaching in a subject in a transparent way. Further, the large classes with 120 students are logically being taught by more than one teacher in separate sections. In such cases, there has to be complete coordination of the teachers in the course delivery for maximizing the benefits to the students.
5. It has been told to the Committee Members that M.Tech. and Ph.D. students are not engaged for assisting the teaching activities of the Department in undergraduate and post-graduate laboratory or tutorial classes. MHRD fellowship has this requirement, and the Department should engage the M.Tech. and Ph.D. students with MHRD fellowships for assisting in the teaching activities regularly as per the prescribed norms of MHRD. Of course, in such cases also the faculty member shall remain as the main officer in-charge of the tutorial/laboratory classes.
6. For the teaching of modern time, the students need to be exposed to all essential software, so that the students become employable in the industry directly by learning these, as different commercial software are used frequently by the industries.
7. The courses having both theory and laboratory components, should taught with special care so that parity and consonance of theory and practical classes are maintained, to avoid any mismatch of the coverage in the lecture and practical.



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(b) Research

1. All research facilities like computing infrastructure of the Department, software and the library facilities (through e-Journals) are to be up-to-date and complete always. Further, all software licenses, and equipment, etc are to be upgraded regularly as research demands these to be the latest. Number of licenses and upgradation or renewal to latest version of software along with the maintenance contracts must not be constrained due to the availability of funds.

Lack of more number of licensed software and computers / workstations are deterrent for the students to work freely. Also, as informed to the Review Committee, the Department is not connected to the central computing facilities through WAN/LAN, as a result of which the students cannot utilise the central facility conveniently.

2. Post-doctoral research students are not found during the review. There must be a sizable pool of post-doctoral research students contracted with attractive fellowships for high quality cutting-edge research in each of six specializations of the Department.
3. The laboratories including CAD laboratory functions routinely between 9:00 A.M. to 5:00 P.M. The laboratories are required to be kept open for research work of Masters and Ph.D. students, as will be required, round the clock (24 X 7). This would need extra staff as well as scheduling their duty hours, etc.
4. In the interest of exposing the students to the practical problems, the faculty may be assigning many consultancy related works to the students. But, too much of it will have adverse impact on the student's academic performance as well as his research output. The faculty member needs to devote more time (for discussion and guidance) with students being supervised, to realise quality research output.
5. All high quality research (of faculty and student) should be published at regular interval, and all faculty must insist on publishing the students' research as the research progresses from one stage to the other, and when research is completed. Publications are required to be in well-known referred journals of high impact factors.
6. Encourage more interdisciplinary research within Department (among the specialization groups) and across Departments. Also, highly specialized course at M.Tech. and Ph.D. level may need joint teaching of faculty members of different Departments.
7. Student and faculty exchange opportunities with Institutions within the country and from abroad are to be developed/created for taking up inter-institution research on high end subjects and topics of Civil Engineering interests.
8. Department has shown evidence of publishing research in high quality journals. It needs to take up research in other niche areas and also to increase the rate of publications, especially in some specialization groups. The credit in acquiring patents has not been appreciable, which needs to be also taken up with urgency. However, the contribution of the faculty in development of national level codes and standards is quite significant.
9. It appeared that the Department has significantly higher number of consultancy projects in comparison to the sponsored and collaborative research projects. The fund flow to the Institute through these show a proportion of 1:4, which is not desirable, as faculty is probably spending a significant amount of time for these petty


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projects with very little teaching and research advantages. It is recommended that in next three years this should be brought to a situation where research and consultancy shapes it to 3:1 proportion.

(c) Basic Infrastructure

1. Students working in the laboratory suffer from the power cuts. Alternatively, there should be adequate power back-up arrangements for the research students' works, as the experiments can be very critical with power problem. In extreme cases, arrangement may be made with power sources (the Agency) to make these announced power cuts.
2. Toilets for ladies should be distributed in each building and preferably in each floor as number of girl students are quite significant.
3. In some laboratories (all specializations) there are constraints on space for setting up experiments for both M.Tech. and Ph.D. students. The experimental works are to be better scheduled, and the Department should ensure adequate space for experimental set-up of the students, so as get faster research outputs through students' research.

(d) Others (Departmental Working)

1. Students should be allowed to work freely across the specialization groups for using the facilities available across the different groups, with minimum formalities and avoiding undue paper works for permission etc. These needs to be simplified.
2. The procurement of laboratory materials should be simplified so that all constraints and delay in procurement are eliminated in the interest of research progress at a fast pace. Decisions on all these procurements of chemicals and consumables, etc be given to the Department with full authority.
3. The contingency fund available for the M.Tech. and Ph.D. students seem to not enough for the experimental set up required for research. Thus, often the students need to spend for setting up of the laboratory experiments for their research project. The contingency fund available seems to be inadequate the Department may look into it with Institute's direction for it.
4. The operating budget of the Department should be increased with flexibility in the norms and authority of expenditure of the Departmental needs, like laboratory supplies, AMC for equipment and software, repair of equipment, etc. Department be authorized for all such expenses. While companies of equipment and software demand advance payment for AMC, while the Institute policy does not permit any advance payment, which is a serious flaw. This requires serious look by Department and Institute, as in some cases, the AMC can prevent large expenditure in the long run, especially for upgrades of software and high-end equipment.
5. Adequate Departmental fund seems to be lacking for employing casual/work-charge labours for doing manual work required in most of the laboratories of the specialization groups. Some of them employ out of their consultancy project funds of the faculty to get the experimental work done conveniently, as the Institute does not provide for such casual labours. It seems, often the shortage of laboratory technicians is also compensated through casual labour. However, all groups in the Department do not have similar level of consultancy works and hence engaging casual manpower becomes difficult. Department needs to sort out this problem for getting experimental work done conveniently by the students.


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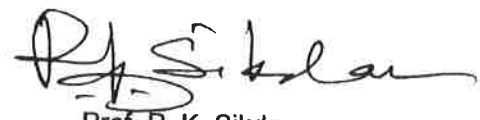
6. Laboratory staff seems to have reduced significantly over the years, without any further fresh recruitment. Some reshuffling also have been done between laboratories, from time to time, based on the work load of different laboratories. Shortage of laboratory technicians are likely to effect the experimental research using modern equipment. Further, arrangements should be made to provide requisite training to the existing technical staff (laboratory staff) to upgrade their skills, so as to handle newer equipment and computer based systems, which are being added to each laboratory regularly.
7. Consider enhancing Alumni contacts within Department (for Departmental alumnus) for long term benefits to the Department, in terms of support for creation of Departmental infrastructure/equipment/fellowships, etc.

Concluding Remarks

Based on the above review and analysis, it has been concluded that the Department of Civil Engineering is delivering its responsibility in teaching, research and services in an excellent way as it should be for a premier academic institution. The faculty, new and old, are to be encouraged to maintain pedagogical excellence and continue to demonstrate deep commitment for scholarly work. A balance in the effort of the faculty members in teaching, research and services to be maintained as 40%, 40% and 20%. In our opinion, the Department of Civil Engineering at IIT Roorkee stands between 8 and 9 on a scale of 10.

We would like the Department to flourish with its research so far pursued and innovating into the other niche areas including trans- and cross- disciplinary areas. Also, recommend to generate more private sector funding for research through mega projects and programmes.


Prof. S. K. Bhattacharyya 15/04/14
Director CBRI


Prof. P. K. Sikdar
President, ICT.Pvt. Ltd