

**Review Committee Report of
Indian Institute of Technology, Patna
April 9-10, 2014**

Members

**Professor K L Chopra
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I. General Considerations

The institute has adopted the following vision and mission.

VISION

To reach the top of the pyramid of education, research and innovation

MISSION

- Continuous evaluation and improvement of course curriculum for B.Tech. M. Tech. and Ph. D. level courses. This will enable the Institute to develop a globally competitive curriculum.
- Procurement of high end and state of the art equipment. This will enable faculty members and research scholars to perform innovative research and make their presence felt in the national as well as the global arena.
- Initiate Industrial collaboration and extend consultancy to industries.
- Increase social outreach, develop solutions for issues of the state and the nation and contribute to the society.
- Good placement of all students in reputed Industries as well as in academics; this will ensure a bright future for the students and put the Institute in global contention increasing its visibility and presence.
- Expansion of departments by starting new programs, hiring new faculty members and to produce at least 10 PhDs' per year (engineering).
- Self-sustenance of the departments by fund generation through project, consultancy and others.
- Become a national role model for developing incubation centers directed towards the growth of national economy.

A. Progress So Far

- The institute has been mentored, since its inception by IIT Guwahati. In line with its vision and mission over the past six years, IIT Patna has developed good teaching and research programs.
- Sufficient well qualified faculty have joined the institute and developed the research areas of their interest, which are relevant for national strategic and industrial needs.
- It is to the credit of IIT Patna, that in a relatively short period of time, the institute faculty has contributed significantly to research publications and patents.
- IIT Patna has been able to attract good meritorious students through JEE and despite constraints of space, the institute has been able to build a very good infrastructure to carry out the teaching and research activities.
- Amongst the new IITs, IIT Patna is one of the first to develop a new residential campus, to which it is expected to move soon.

- IIT Patna has also established good infrastructure to record and make available through intranet to all the students online, the lectures delivered by their faculty. The students have access to other lectures available online.
- The institute has undertaken recently a detailed internal assessment of all the existing departments, involving external experts,. The strengths and weaknesses of each department have been identified.

B. Plans for the Future

- All the departments have developed a roadmap for the future both in terms of teaching and research programs.
- In addition, the institute has proposed several interdisciplinary centres of excellence to promote industry oriented and nationally relevant areas of research, development and innovation.
- Future plans include establishing incubation, innovation and entrepreneurship centres.
- It is recommended that
 - There should be a judicious balance between introducing new academic programs and consolidation of existing programs.
 - Senior faculty at professor level must be appointed in each department as soon as possible. The difficulties in recruitment of senior faculties which include pension related issues, need to be sorted out by the MHRD.
 - The plans for interdisciplinary centres of excellence must be critically reviewed by a team of external experts in the concerned area.
 - There should be an institutional mechanism established to continuously review and make appropriate changes in the course curriculum, based on feedback from all stakeholders, in particular the future requirements of the employers.

C. Measures adopted towards the progress made thus far and the plans for the future

- The recent internal assessment exercise, as directed by the MHRD, appears to be suitable and robust.
- Similar review should be conducted at regular intervals and more efforts should be made to involve all stakeholders in this review exercise.
- The Board of Governors should take appropriate actions on the recommendations made by these review committees.

II. Specific Indicators

1. Curriculum and Courses Offered

i. Range of degrees and disciplines.

B.Tech

- Computer Science and Engineering
- Electrical Engineering
- Mechanical Engineering
- Chemical Science & Technology
- Civil & Infrastructure Engineering

M. Tech

- Mathematics & Computing
- Nanoscience & Technology
- Mechatronics
- Computer Science & Engineering
- Communication System Engineering

Ph.D.

- Chemistry
- Civil & Environmental Engineering
- Computer Science & Engineering
- Electrical Engineering
- Humanities & Social Sciences
- Material Science & Engineering
- Mathematics
- Mechanical Engineering
- Physics

ii. Consistency of curricula with academic vision.

In line with institute vision and mission (Ref Section I)

iii. Vision for curricula and academic offerings 5-10 years in the future.

IIT Patna plans to start dual degree programs, integrated MS, M Tech and PhD programs and executive M. Tech. programs. There is a plan to introduce major and minor programs in various departments. School of humanities and social sciences intends to start Master Program in Human Development.

iv. Quality of programmes (Under-graduate/ Post-graduate)

a. Relevance to recruiters (Industries/ academic institutions/ R & D labs).

Overall the courses offered are in line with the requirements of national and international companies along with adequate scope for higher studies in reputed national and international universities. Some of the programs such as nano-science and technology and mechatronics need to be revisited for their relevance to the Indian industry.

b. Periodicity of curriculum review at both UG and PG level.

The institute has completed five years. There is certainly a need to review and revise the curriculum at both UG and PG level. For future, an institutionalized mechanism to review, on a continuing basis, is needed.

c. Mechanism for program review at the UG and PG level.

An institutionalized mechanism to review, on a continuing basis, is needed. Feedback and inputs from all stakeholders should be invited for this purpose.

d. Course work mandated for Masters' students and the average courses done per Master's student.

Two semesters course work is mandatory for Masters' students with 5-6 courses per semester.

e. Course work mandated for PhD students and the average courses done per PhD student.

Qualifications	Number of Courses
M Tech	2
B Tech/BE	6
M Sc	4

In addition, HSS course on "Technical Communication" is compulsory. It is recommended to introduce another compulsory course on "Responsible Conduct of Research".

f. Student placements

Student placements in the past have been good but concerns remain for the current batch. The efforts of placement office have to be strengthened.

2. Teaching environment

a. Teachers Adequacy: (eg. Teacher - Student Ratio for each academic department)

Department	T-S Ratio
CSE	11 / 207 = 0.053
EE	14 / 204 = 0.068
ME	13 / 199 = 0.065
CE	5 / 26 = 0.192
MSE	3 / 5 = 0.6
PHY	8 / 34 = 0.235
CHEM	8 / 36 = 0.222
MATH	9 / 35 = 0.257
HSS	8 / 12 = 0.666

Aggressive efforts have to be made in the engineering departments to reach the desirable ratio of teacher-students (comparable to existing IITs), as well as required cadre ratio. It is an area of concern that several departments do not even have one professor/associate professor to lead the department.

b. Average number of tutors in courses with more than 100 students

Existing number is 2-3 for around 100 students. One should strive to reach a ratio of 4-5 per 100 students.

c. Quality of engagement of teachers with students. (Student feedback on courses and curricula)

Fair. Some students are not happy with the response of the administration to their feedback on different aspects of teaching/learning.

d. Number of students who were motivated to opt for careers in engineering/science/ technology sectors. Base on available data, for at least last five years).

130 out of two batches graduated (total number 182) have been placed in core companies.

e. Adequacy of infrastructure teaching labs and equipment, for example by assessing average number of students per experiment in core courses.

3 There is scope of improvement on this count. There is a need to develop more undergraduate labs/new experiments to promote project based learning.

f. Adequacy of laboratory assistants

Adequate in the current scenario but there is a need to recruit more laboratory assistants for the future.

g. Modernization of libraries: extent of electronic accessibility to library resources.

Books=10036

E-Journals: 7519 from 34 publications

E-books:93000 + Databases: 3

Electronic version of all important journals are available.

Library also has annual subscription to literature search tools SCOPUS, SCIFINDER, MATHSCIENT, which are used by research scholars as well faculty members for literature search related to research.

h. Availability of students' workshops/"tinkering" labs to students so that they may pursue their own ideas

The institute has various technical clubs where the students can experiment with their own ideas including facilities for fabrication. The Departments are open to students till midnight and on all the days of the week. Innovation and incubation centers exist. Some students take up group projects even in their second year.

i. Feedback from employers in science/ engineering sectors. The placement office should be mandated to obtain annual feedback from employers (industry/ R&D labs/ academic institutions) about the quality and performance of the Institute's students in key parameters. See also point 8 below.

Satisfactory, but placement office activities need to be strengthened.

j. Internal assessment reports of departments and centers. These reports should have been discussed at length in institute's senate.

Since there are a few professors only, there are not enough senior people in the senate. Each department however was thoroughly reviewed by a team of experts recently. The reports were discussed in a special faculty meeting, Institute Academic Program Committee (IAPC) and in the senate.

3. Research and Development

a. Range of research activities: (i) Volume, (ii) Breadth

Department	Number of faculty	Number of research areas
CSE	10	5
EE	14	7
ME	13	3
CE	5	4
MSE	3	3
PHY	9	4
CHEM	9	9

MATH	9	5
HSS	8	4

b. Publications per Faculty /Masters/ PhD student

Faculty: 4; Ph. Ds': 3 per year on the average

c. Publications per Faculty /Masters/ Ph.D. student in a list of top 10 journals in broad research fields as identified by the Institution's departments/ centers. This list of journals should be vetted appropriately by an independent group of peer s/ experts and updated periodically every 5 or more years.

No vetted list yet. On an average, faculty publishes in standard peer reviewed journals. The list of publications by each department and the corresponding journals are given in the departmental review report by external experts, submitted recently. IIT Patna has over 400 publications in standard peer reviewed journals during the last five years. The highest impact factor of the journal where a paper has been published is 31.7. The publications from IIT Patna have more than 800 citations.

d. Average number of citation per department/ center / school.

175

e. Number of papers with citations that are more than the average number of citations of the journal in which they are published.

15

f. Other major research contributions: Technology developed/ technology transferred/ patents filed/ patents obtained/ etc.

- Patents filed: Five

g. Recognitions & Awards (national and international) to faculty/ research staff/ post-graduate students

- Young Scientist Award,
- Bhaskar Advance Solar Energy Fellowship Award,
- "Research Stays" (Forschungsaufenthalte) Fellowship by DAAD.
- Prof. M.N. Srinivas Memorial Prize, 2013.
- TCS Research Fellowship
- 2013 ASME Computers and Information in Engineering Division's Best Dissertation Award.
- Young Scientists award in Engineering Sciences
- IIT – DAAD Masters Sandwich programme
- Max Planck Fellowship

- DAAD Young Ambassador for the year 2013
- Gandhian Young Technological Innovation Awards 2014
- S.N. Bose Scholars Program
- Dr. J.C. Bose National Teachers Excellence Award, 2011
- Fellow of INSA, New Delhi.

4. R&D environment

a. Average time that it takes a new faculty to set up lab.

One year or more

b. Retention of young faculty: What percentage of young faculty remains with institute for at least ten years? Based on data of previous decade.

90 %

c. Consultancy and project money from non-internal sources.

Rs. 20.16 crore

d. Research grants/ seed money from internal savings of the Institute to young faculty/ post-doctoral fellows/ Post graduate students.

New faculty recruits are supported for the first one year until which they bring money through external projects. Additionally, immediately after joining, new faculty members are given one research scholar (as Institute Fellow) whose fellowship is completely funded by the Institute. Ph.D. students receive contingency grant every year. Provisions for high value fellowships for exceptionally brilliant students also exist presently with an aim to attract talent. Faculty members and students are encouraged to participate in conferences and workshops.

e. Collaborations internally and with other Institutes: number of paper s/ projects/PhD students with collaborating authors/ mentors.

Papers: 16

Projects:8

Joint Ph.D.: 2

f. Adequacy of research infrastructure, labs and equipment.

Considering that the institute is only five years old and it is currently housed in the transit campus, adequate infrastructure exists in research labs and equipment.

g. Adequacy (number and competence) of research and technical assistants/ officers/ engineers.

Research and technical staff have adequate competence to run the routine operations involved in the research laboratories. Some of them have demonstrated skills to run important equipment.

h. Number of large interdisciplinary research projects.

Four such interdisciplinary programs have been proposed as centres of excellence. It is however recommended that the feasibility of these programs be examined by a team of external experts.

i. Work space for Ph.D. scholars, i.e., do they get their own desk/ computer?

By and large, yes.

j. Number of international conferences/ workshops attended by a Ph.D. student (for exposure/ paper presentation)

30 out of 140 PhD students have had an opportunity to attend an international conference during the past five years, with institute support.

k. Number of papers with PhD student as first author

134

l. How many M.Tech students were motivated into pursuing PhDs. How many joined PhD programs at own/ sister institutes? Base on available data, for at least last five years.

5

m. Number of PhD graduates who pursued a career in academics, (abroad or IIT/ IISc/ TIFR/ CISR/ BARC/ R&Dlabs etc.). Base on available data, for at least last five years.

6

n. Number of post-doctoral scholars hired in the institute

Four

o. Number of International students as PhDs / post-doctoral scholars

None

p. Visiting researcher programs: Strength/ extent of engagement measured e.g., by

(i) Number of international visiting researchers who stay for at least a week.

13

(ii) Number of courses/ workshops with international participation.

6

q. Internal assessment reports of departments and centres. These reports should have been discussed at length in institute's senate.

Self-assessment of the Institute in 2013 was discussed at length in the senate. Since there are a few professors only, there are not enough senior people in the senate. Each department however was reviewed by a team of experts recently. The reports were discussed in a special faculty meeting, Institute Academic Program Committee (IAPC) and in the senate.

5. External Stakeholder Engagement

A. Industry Collaboration

a. Number of PhD/Masters theses directly linked to/ funded by industrial projects

2 PhD and 4 Masters

b. Total income from Industry Sponsored Projects

Rs. 27 lakh

c. Technology transfer / adopted by labs, industry

One

d. IPR and patents. Please report patents obtained/ filed separately.

Five. Details are as follows :

- Insulin Mimetic Active Comprising Pharmaceutical Composition obtained thereof, Indian Pat. Appl. (2012), IN 2011KO00401 A 20121116; PCT Int. Appl (2012), WO2012131689 A1 20121004 by Chaudhari K Mihir, Hussain Sahid, BharadwajSaitanya, Sinha Upasana B., TalukdarDhrubajyotiMajumdarSubeer S., Bhattacharya Sushmita, DasguptaSuman, Kundu Rakesh, Bhattacharya Samir and Bhattacharya Shelley.
- Patent Application No: 200780018481.7 for China, entitled "THERMOPLASTIC ELASTOMER COMPOSITION, METHOD OF MAKING AND ARTICLES THEREOF", **granted on 14-11-2012** as Patent No. 200780018481.7. Invenors : Samik Gupta , A. Menon and Anil K. Bhowmick

- A biaxial stretching device for simultaneously stretching of an elastomer sample, C. Mahender, D. Siddhartha, R. K. Sahu, K. Patra, S. Bhaumik, A. K. Pandey and D. K. Setua, Patent application no. 985/KOL/2013 dt. 26.08.2013.
- Patent File No.732/KOL/2013; TITLE: Rubber clad squeeze rolls for metal cleaning section of high speed lines of cold rolling mill. Principal inventor: Atanu Banerjee¹. Co inventors: Nilotpal Dey¹; B Dutta²; A K Bhowmick³ [1 Tata Steel; 2 Consultant to Tata Steel; 3 IIT]
- Patent File No.1124/KOL/2013; TITLE: A rubber formulation for application on rubber clad rolls in an electrolytic cleaning line operating with alkaline medium after cold rolling operation of steel sheets. Principal inventor: Atanu Banerjee¹. Co inventors: Nilotpal Dey¹; B Dutta²; A K Bhowmick³ [1 Tata Steel; 2 Consultant to Tata Steel; 3 IIT]

e. Curriculum development initiatives for Industry

- M.Tech. degree in Mechatronics
- M.Tech degree in Mathematics & Computing

Executive M Tech program is being initiated at IIT Patna to provide opportunity to executives in the industry to enhance their knowledge and skills.

B. Contribution to National Development Goals/Priorities

a. Number of nationally relevant research projects, e.g., in sectors of defence, medicine, environment, energy, health, infrastructure, etc.

10

b. Engagement/ help/ leadership provided to other technical institutes/ labs in areas of teaching and research, e.g., via programs such as TEQIP, or availability of specialized laboratories, etc.

- Orientation course for Physics teachers.
- Orientation course for Mathematics teachers
- 'Advanced Workshop on Mathematical Epidemiology & Differential Equations (AWMEDE-2013).
- Research Scholars' Day
- Patents and IPR Workshop and HPC & Smart Building.
- Workshop on "Cryptography".
- Indo-Australia Workshop on "Optimization Techniques for Human Language Technology".
- 14 day Short-term Training Program for the Engineers of the Building Construction Department (BCD), Government of Bihar.
- Short-term course on "Employability Skills and Success at Workplace".

- Society of Automotive Engineers (SAE) organized Inter-College Auto Quiz competition.

c. Policy Inputs/ Consultancies

2

C. Social Responsibility

a. Community relevant projects, social outreach

- Department of Chemistry has the DST Inspire resource person for 2012-13.
- The Department of Physics conducted an orientation course for physics teachers teaching classes 11th and 12th.
- Department of Civil & Infrastructure Engineering organized courses for Civil Engineers of the State.
- Department of HSS organized a program for less privileged women and children of the state.

b. Sensitiveness to on-campus labour / environment/ energy/ water / land etc. issues.

Safety norms practised in labs. Institute biosafety committee is constituted to help institute comply with international norms.

c. Environment/ energy/ water / land/ employment impact on local communities

A large proportion of supporting staff is from the local communities.

D. Alumni Engagement

a. Contributions from Alumni

Not yet available. IIT Patna has interacted alumni from other IITs and also arranged two Alumni Day programs. Their support is coming to the institute in various forms.

b. Engagement with alumni (academic/ publicity/ policy/ growth)

Alumni meetings have been held.

6. Vision for the future:

To become a world class institution in education, research and innovation

7. Governance and Financial Resources

i. Management

a. Adequacy of administrative support/ systems in relation to the level of activities envisaged?

Requires to be strengthened considerably

b. Responsiveness of the system to faculty, student needs

Not adequate due to variety of reasons including shortage of competent support staff and lack of institutionalized mechanisms for grievance redressal for faculty, students and staff

c. Periodic feedback/ evaluation of administration from the institute's stakeholders (faculty/ research staff/ students/ etc.). Should include parameters gauging sensitivity/ efficiency and pro-activity/ transparency.

Although the Director meets the faculty, students and staff periodically, it is not adequate. Institutionalized mechanisms for grievance redressal for faculty, students and staff have to be created.

a. Fund mobilization (besides MHRD)

i. Internal Revenue Generation as percentage of Non-Plan expenditure

Year	2008-09	2009-10	2010-11	2011-12	2012-13
Internal revenue generation (Rs. in crore)	0.31	1.65	1.83	4.71	8.64
In percentage of Non-plan expenditure	16.6	32.1	15.2	36.5	52.6

ii. Corpus Fund

IIT Patna has taken action to create a Corpus fund in the Institute. All the Overhead, donations, interest etc. will be kept in this fund and invested suitably.

b. Cost Efficiency

i. Cost per student

Rs.2.58 lakh

ii. Fee per student per annum/ Non-Plan Expenditure per student

- Gen/OBC : **B.Tech**-Rs. 1,26,838/-; **M.Tech**-Rs.49,625/-; and **Ph.D.**-Rs. 42,088/-

iii. Total fee paid by student (discounted)/ Per annum average salary

- SC/ST : **B.Tech**-Rs. 36,838/-; **M.Tech**-Rs. 39,625/-; and **Ph.D.**-Rs. 37,088/-

iii. Transparency:

Mechanism of transparency in place by the Institute as steps that have been taken for internal quality assurance

a. Transparent decision making processes

- IIT Patna has continuous recruitment processes all over the year for faculty and non-teaching staff members through open advertisement in national newspaper.
- Right from advertisement to selection of the candidate, all the relevant information is being uploaded on the website regularly.

b. Academic issues, research grants, systems for recognition/ awards etc.

IIT Patna has a system of academic governance as per the Act and the Statutes for example, Institute Academic Program Committee (IAPC) and Senate, which comprises of the Director, all Heads of Department and Heads of Programs. However to make the senate and other academic bodies to become more effective, more senior faculty at the professor level have to be inducted in the system. Academic decisions are reviewed and suggested for further action either within the institute or through experts. Regarding awards, IIT Patna recently has Institute Best Teacher Award and also there are mechanisms for awarding meritorious students and researchers.

c. Procurement processes

- The procurement process is transparent.
- All the details are advertised in national newspaper as well as e-portal and the guidelines received from MHRD are being followed.
- E-procurement system is partially in place and efforts are being made to make it completely IT enabled.
- The GFR & guidelines provided by MHRD are being strictly followed to procure the materials and services.
- The procurement systems should however be simplified in order to expedite procurement of urgent equipment and research infrastructure facilities

d. Infrastructure development, right from requirement to planning to execution.

- Even in transit campus, adequate infrastructure has been developed. Five buildings in near around the main building for academic activities and research have been hired.

- 5 apartments with 90 flats for residences of our faculty and staff have been hired. Recovered 20% HRA and license fee against the accommodation provided.
- Bihar Government is kind enough to build five hostels to accommodate the students.
- The permanent campus at Bihta is expected to be ready by July, 2014.

e. Proactive disclosure on all critical issues

- All relevant and important information has been uploaded on the website for public.
- RTI and grievances related information to Government of India portal every month have been addressed.
- All the information has been uploaded to IIT Council portal continuously.
- High level personal financial transparency is maintained. The details of Annual Property Returns of all faculty and staff members on the website have been given.

iv. Infrastructure: Is the support infrastructure (IT, Hostels, Faculty/ Staff housing, sports facilities) adequate? And how sensitive and eco-friendly it is to the campus and surrounding environment (land/ water / energy/ greenery).

Although it is only a transit campus, the support infrastructure has been made adequately by hiring buildings for running academic programs. New eco-friendly campus at Bihta is on schedule and it would be ready to move into, shortly, certainly by end of this year. The new campus will be rated as GRIHA 4.

It is encouraging to note that despite constraints of a transit campus, the following facilities have been provided for the benefits of the students:

- **Sports Facilities:-** Basketball court, Volleyball court, Badminton court (outdoor and indoor), Cricket pitches etc. Also Gym facilities in boys' hostel as well as girls' hostel are there and IIT Patna is making best use of multigym with treadmill.
- Cultural Facilities in IIT Patna Campus:- Music Hall – 1, Gymkhana- 1 (70 ft X 30ft) Alumni Association Activities
- **Student counseling & Student guidance & monitoring**
- **Self-Development and Wellness Centre** has been started at IIT Patna (Sep. 2013).
- **Training and Placement Cell (TPC)** of IIT Patna is actively engaged in developing relationship between the Institute and various industrial, R&D organizations and PSUs.

8. Stakeholders Survey

a. Internal Stakeholders (students, faculty and support staff)

b. External Stakeholders (industry, alumni, community leadership and government)

The committee met students (undergraduate and graduate), faculty, support staff, some alumni, parents and participants from the industry in separate meetings. Our significant observations are as follows:

- Students, both UG and PG are, by and large, happy with the teaching and learning practices in the institute. Many of them are utilizing the recorded lectures being uploaded on the institute intranet.
- Although the placement was excellent last year, there was a concern expressed by students on the situation this year. Efforts of the placement office need to be intensified.
- There is a need to create an institutionalized mechanism for grievance redressal for all stakeholders.
- Due to lack of adequate senior administrative staff, there are procedural delays being experienced by faculty and students.
- There should be a judicious balance between introducing new academic and research programs and consolidation of existing programs.
- Innovative mechanisms have to be found to inculcate a professional attitude in the students towards industry and the expectations from their future employers.

9. Diversity

(What is the current status of diversity (gender / international) on campus? Does the Institute have programs to promote diversity among students, staff and faculty? Does the Institute have adequate mechanisms to deal with issues related with discrimination and harassment? Reports of such cases and action taken should be made available)

There is no gender bias in this institute. There is a functioning Womens' Cell.

(K L Chopra)

(R Natarajan)

(K K Aggarwal)

(Pradip)

Members of the Review Committee