

Summary Report

About Department/Center/School: The Department of Industrial & Systems Engineering (ISE), formerly known as Industrial Engineering and Management (IEM), was established in 1973. The department, for the last four decades, has been instrumental in imparting training and extending frontiers of knowledge in the field of Industrial Engineering and Management through its well established undergraduate, post graduate and research programmes, sponsored projects and industrial consultancy work, short term courses and other continuing education programmes. Today, the department is well known across the nation for its excellent research and consultancy potential and capability in the field of Industrial Engineering and related areas.

1. Academic Programs (Range of Degrees and Disciplines):

- B.Tech (Industrial Engineering)
- Dual Degree (B.Tech. in Industrial Engineering and M.Tech in Industrial Engineering and Management)
- Dual Degree (Quality Engineering Design and Manufacturing)
- Dual Degree (B.Tech in Mfg. Science & Engg. and M.Tech in Industrial Engineering and Mangement)
- M.Tech (Industrial Engineering and Mangement)
- Ph.D

2. Major 4-5 Thrust Areas of Research:

i) Supply Chain & Logistics ii) Industrial and Business Analytics iii) Decision Support System iv) Human Factor and Safety Engineering v) Product Process and Service Excellence

3. Curriculum and Courses & Teaching Environment

Items	Ratio/ Number	Items	Number/%
Teacher-student Ratio	1:31	Average No. of students motivated (%) to opt for careers in Eng/ Tech. Sectors UG/PG/PhD	80/90/90
No. of Faculty members as on today	12	Average No. of students motivated (%) to opt of careers in Science sectors UG/PG/PhD	4/3/2
Average No. of Tutorial Assistants	25	No. of teaching labs	05
No. of UG/DD students	130/181	Average No. of students per experiments in core courses	1 to 4
No. of PG students/PhD students	22/37	No. of workshops/ Tinkering labs	1
Average no. of tutors with more than 100 students	3	No. of new courses introduced	4
Average Students placements (%) (UG/DD/PG)	92/91/ 57	No. of New program introduced	1
No of major curriculum review in both UG & PG level	1	Undergraduate Vs PhD strength expressed as Percentage	77.8/22.2
No of UG lab (teaching labs) developed/set-ups	5	No of PG/research labs developed/newset up	0/0

No of E class rooms	5	No. of lab classes per week	07
Average No. of Course done per student for B. Tech/DD /M. Tech/Ph.D	54/58/15/4	No. of core/elective/seminar/ projects subjects taken for B. Tech, DD, and M. Tech respectively	44/10/0/3 44/14/0/7 8/5/2/2

4. Research and Development & its Environment

Items	Number	Items	Number	Items	Number
Total No. of Publications in Journals (2008-13)	163	Average no. of citation per paper	4.125	No of large interdisciplinary research projects	2
Total No. of Publications in Conference & Symposium	29	Average Journal publication per year	27.16	Number of Int. conf./ workshops attended by students	46
Total No of Books & e-books published	5	h-Index of the department since 2008/ overall h-index in Scopus	38	No. of PDF hired in the Institute	0
Total No of Edited Conference Proceedings/book chapters	10	Number of papers with citation more than the average no. of citation of the Journals	51	No. of international Students as PhDs/PDFs	0
Total No. of Technology Developed/transferred	5/5	No. of recognitions & Awards, fellows etc to faculty/students (provide break up if necessary)	7/5	No. of International visiting researchers/adjunct faculty stayed here for at least a week	7
Total No. of Patents Filed/Obtained	0/0	Average Retention(%) of Young faculty for at least 10 years	60	No. of short courses/workshops /conf. organized with international participations	5
Total No. of Copyright Filed/Obtained	1/1	No. of Sponsored research Project /fund(lakh) generated from non-internal source	14/299.44	Average No. of PhD granted per year	7
No. of Publications per Faculty/Masters/PhD students	14/38/71	No. of Consultancy /fund (lakh) generated from non-internal source	19/792.98	Average No. of PhD Granted per year per faculty	0.6
No. of Publications per Faculty/Masters/PhD students in Top Ten Journals as Identified by the department	10/28/56	No of Internal and external Collaborations research papers /research projects /PhD students	6/27/31 127/15/10	Patent granted per faculty	0

Average No. of Citation per faculty per year	16.78	No of M. Tech students motivated into pursuing PhD/PhD graduates motivated to pursue career in Academics (abroad or IIT etc)	11/13	Number of articles in collaborations with Ten countries*	33
Ranking of the department in terms of average citations per paper within the Institute	6 [#]	Ranking of the department in terms of total number of Journal publications within the Institute/ publications per faculty	10/10 [#]	No of articles of the dept. contributing towards h-index of the Institute since 2008	92

Among Engineering Discipline

5. External Stakeholder Engagement and others

Items	Number	Amount Lakh
No. of PhD/Master students' thesis funded by Industries	7/62	NA
Total number of Industry sponsored projects and its income (Lakh)	2	34.68
No. of Curriculum Development Initiative for Industries	16	NA
No of Technology transfer/adopted by Industry/Labs	5/5	NA
No. of Nationally relevant research projects	3	96
No of Policy inputs/consultancies provided	19	792.98
No. of Research grant and seed money from internal savings of the Institute per young faculty of the department and its total fund	3	15.00
No. of Community Relevant projects	4	268.74

6. Vision for the Future (in brief):

(a) Departments/centers/schools should spell out its Mission and Vision Statements, (b) Plans for future to achieve the projected goals and (c) measures adopted towards above.

Vision:

Department of Industrial and Systems Engineering embodies to act as a repository of knowledge and practices covering the broad domain of Industrial Engineering and management sciences and to nurture the students by way of teaching, research and industrial partnership.

Mission:

- Achieve global excellence and create local impact in research and teaching.
- Design and develop contemporary courses in line with the new developments in academics internationally as well as tailor-made for the companies to meet their emerging requirements.
- Enhance the analytical skill and problem solving ability of the students through innovative design and conduct of teaching, laboratory experiments, case studies, seminars and colloquium.
- Pursue research in the emerging fields of industrial engineering and management sciences through enhancing core competence internally as well as through collaboration with internationally renowned academic institutions worldwide.
- Interact with industries through consultancy services for real life problem solving.

Future Directions

Supply Chain & Logistics

- Food Supply Chain
- Logistics Development for SEZ
- Port Logistics
- Railway Logistics
- Parcel Management System

Decision Support System

- Information System
- Decision Modeling
- Simulation
- System Dynamics
- Statistical Modeling

Product, Process and Service Excellence

- Lean Engineering
- Six Sigma
- Quality Engineering
- Service Science

Industrial & Business Analytics

- Product life cycle
- Fault analysis
- Self diagnostic for m/c tools and equipments
- Supplier Analytics
- Customer Relationship Analytics

Human Factor & Safety Engineering

- Safety Analytics
- Risk Assessment
- Work compatibility
- Bio-mechanical Modeling
- Human Motion Simulation
- Human Error Analysis

7. External peer review of the Dept./centre/schools (in brief):

(a) **Date of the peer review:** January 29, 2011

(b) **Name of the Experts involved and their affiliations in short:**

(i) Prof. Prem Vrat, Professor of Eminence, Management Development Institute, Gurgaon and Former Founder Director, IIT Roorkee

(ii) Mr. Sandipan Chakraborty, Managing Director, Tata Steel Processing & Distribution Limited, Kolkata

(c) **Overall recommendations of the peer review committee: Strengths, weaknesses, suggestions and comments**

- Faculty and student ratio is a serious cause for concern with senior faculty retiring; it is difficult to see how the department is able to sustain itself; unless proactive efforts are made to hunt faculty; involve industry experts as adjunct faculty and reduce teaching load but enhance project based learning on actual live industrial problems.
- Research has been a strength but it must stabilize at 0.5 Ph. D/ faculty /Year and 3 journal publications / faculty per year. Citations must be included.
- Collaborative research should be encouraged. The idea of having research Publications without supervisor's name is full of danger and will finish research tempo. Besides it is not a global practice: No faculty will take interest in guiding a Ph D if does not share intellectual property rights.
- Foreign collaboration; collaboration with other IIT peers and industrial partners will yield good dividends and is worth exploring.
- Enrich dual degree; revisit M Tech. programme in IEM and either focus in IE only or run it as a sponsored programme for Govt.; business & industry or for QIP and DRDO like institutions.
- A basic course on 'Data Collection, Analysis and Research Methodology' could be introduced to PG/Research scholars.
- Remedial basic courses and Audit courses of 1, 2, 3 credits or independent study to take industry

sponsored projects may be worth exploring.

- Poor employability of M Tech students is a cause for concern. Either enhance it by giving doses of communication skills and personality development, better marketing of programme or phase it out.
- Research is the strength area; need to sustain it.
- IE in Health Care, Agriculture Business; etc. should come in a project mode or through sponsored route but not through general effort of the IEM Department.

(d) Measures adopted/action taken at the department level to address the recommendations of the peer review report:

- The department is trying hard to hire quality faculty and has recruited three faculty members in the last four years.
- Several dual degree and PhD students have been sent abroad in the recent past, which resulted in good number of quality publications through the collaborative research.
- The department has offered several courses for the industry and succeeded in bringing many high value consultancy projects.
- Efforts are being made to take nationally and community relevant research projects in the area of Healthcare and Agri-Business.

8. Strengths, Weaknesses, Opportunities & Threats (SWOT) Analysis of the Department

<p>Strengths</p> <ul style="list-style-type: none"> <input type="checkbox"/> Publications <input type="checkbox"/> Sponsored and consultancy projects <input type="checkbox"/> Industry interaction <input type="checkbox"/> Industry oriented programs 	<p>Weaknesses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Poor students/faculty ratio <input type="checkbox"/> Lack of faculty in some recent areas of interest <input type="checkbox"/> Lack of good PhD candidates <input type="checkbox"/> Lack of trained Lab staff
<p>Opportunities</p> <ul style="list-style-type: none"> <input type="checkbox"/> Can act as a hub for industry academic collaborations in inter-disciplinary areas <input type="checkbox"/> Target mining and steel sector for research and process improvement. <input type="checkbox"/> Decision support models in the service sector – Transport, Energy, Healthcare . 	<p>Threats</p> <ul style="list-style-type: none"> <input type="checkbox"/> Competition from Business Schools <input type="checkbox"/> Shift of focus from traditional IE area to others such as healthcare, analytics, environment etc. <input type="checkbox"/> Entry of foreign universities in this discipline.

Important Highlights

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7. M.Tech Dual (Industrial Engineering and Mangement)
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9. M.Tech Dual (Manufacturing Science & Engg. Industrial Engineering Mangement)
10. M.Tech (Industrial Engineering and Mangement)
11. Ph.D

INFRASTRUCTURE

Class rooms: 5

Seminar rooms: 2 (Occasionally used as class rooms)

Faculty rooms, Office, Head's room

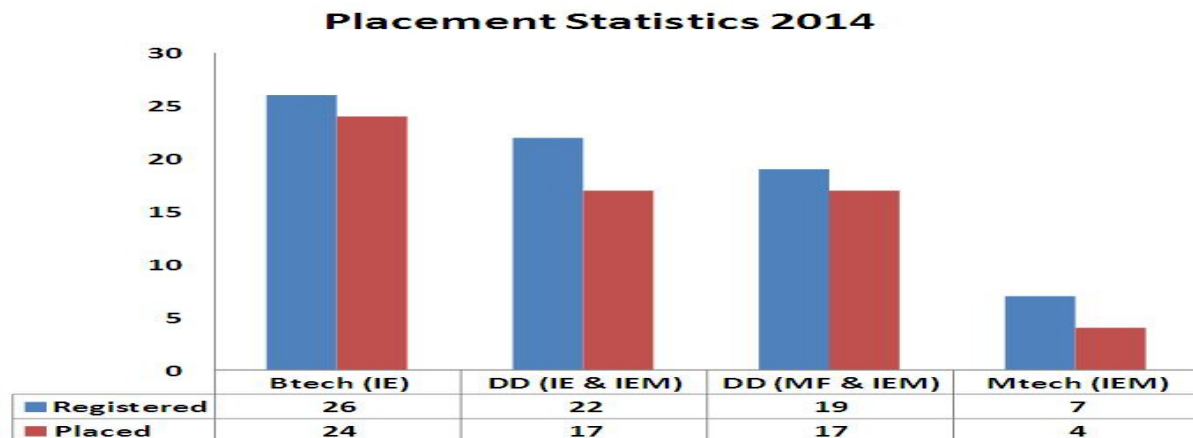
Laboratories: 5

- Computational Lab (Server Lab, E-Business Lab)
- Work System Design Lab
- Quality Design and Control Lab
- Design for Manufacturing and Assembly Lab
- Product Development Lab

Software:

- Optimization: Lingo, CPLEX
- Statistics: MINITAB, SAS.
- Simulation: Arena, Delmia, CATIA, Quest, Stella, Powersim
- Others: Frontier Analyst, Design Ease, Extend
- Institute Level : Matlab, SPSS

PLACEMENT



The students are recruited by industries in IT/ Software services, Manufacturing/ FMCG and Consultancies. Some of the companies that have recruited the students during last five years include:

Finance/Insurance: Deutsche bank, Capital One, American Express, Goldman Sachs, CitiBank, Capital Dynamics, Credit Suisse, HSBC etc.

IT/Software services/Consultancy/Analytics: HT media analytics, Essex lake group, JDA, IBM, Oracle, ZS Associates, PWC, Affine Analytics, Axtria, Wipro, Impetus, Cognizant, Egain, TCS, HCL, Infosys, Opera solutions, Deloitte, Ernst and Young, Capgemini, Genpact, Byte Consulting, Sapient, Market RX, Fair Isaac etc.

Manufacturing/FMCG/ Ecommerce: Schlumberger, ITC, Bosch, Tata Motors, Tata Steel, Maruti and Suzuki, TVS, Hero Motocorp, Danieli, Hindalco, Ispat, Flipkart etc.

SPONSORED AND CONSULTANCY PROJECTS

Research Project

- Total no. of Projects (2008-13): 13
- Total Value: Rs 238.66 Lakhs
- Sponsoring Agency:
Government: CSIR, DSIR, DST, ICSSR, MHRD, Odisha Govt.
Private: Tata Steel Ltd Jamshedpur, TCS Mumbai
International: UKIERI

Consultancy Project

- Total no. of Projects (2008-13): 25
- Total Value: Rs 784.45 Lakh
- Sponsoring Agency:

Government: Central Electricity Supply Utility of Odisha, CMPDI, DRDO, Indian Air Force, Indian Ordnance Factories, MCEME Hyderabad, Ministry of Corporate Affairs, NAARM Hyderabad, NHAI, National Jute Board, NLC, ONGC, State Pollution Control Board Bhubaneswar, Odisha Mining Corporation Limited Bhubaneswar.

Private: Dhamra Port Company, Proctor & Gamble, Tata Steel International: University of Connecticut, University of Sheffield

OUTREACH ACTIVITY

- Short-term Courses for Industry: 20
- Short-term Courses for Teachers: 04
- Conference & Seminar: 02

RECOGNITIONS & AWARDS (NATIONAL AND INTERNATIONAL)

- Prof Manoj Kumar Tiwari, Listed among top 20 most productive authors in the broad area of Production and Operations Management in the last 50 years (Published in IJPE, 2009) (2009)

- Prof D. Acharya, Lillian Gilbreth Award
- Purushottam Lal Meena (PhD Research Scholar) Emerald/ EFMD Outstanding Doctoral Research Award, Supervisor: Prof S P Sarmah
- Prof Manoj Kumar Tiwari, Honored as number one in top 100 hundred authors contributed in the last 50 years in International Journal of Production Research
- Prof Manoj Kumar Tiwari (IEM), Fellow of the Indian National Academy of Engineering (INAE)
- Prof Manoj Kumar Tiwari, Rated 2nd among many researchers working in Logistics and Supply Chain Management in India(Analysis of the logistics Research in India-White paper published in TU Dortmund University, Dortmund Germany (2012)
- Prof P. L. Narasimhan (IEM), Fellow of the Indian National Academy of Engineering (INAE)
- Prof P K Ray, Distinguished Scholar 2013 by International Association of Research Scholars (IARS), Australia