Teaching and Research

9,952 students on roll (4 Nov 2016 data)
3156 Bach., 985 DD, 3006 Masters, 2805 PhD
International students: 2 (DD) + 34 (Masters) + 24 (PhD)

130+ Post-doctoral fellows
1250+ Project staff (Technical)

27 Academic Units + 19 Research Centres

609 full-time faculty, 42 adjunct faculty (Aug 2016)
• Department of Aerospace Engineering
• Department of Biosciences & Bioengineering
• Department of Chemical Engineering
• Department of Chemistry
• Department of Civil Engineering
• Department of Computer Science & Engineering
• Department of Earth Sciences
• Department of Electrical Engineering
• Department of Energy Science and Engineering
• Department of Humanities and Social Sciences
• Department of Mathematics
• Department of Mechanical Engineering
• Department of Metallurgical Engg. & Materials Sci.
• Department of Physics
• Center for Environmental Science & Engineering
• Center for Policy Studies (IDP)
• Center for Research in Nanotechnology & Science
• Center for Technology Alternatives to Rural Areas
• Center for Urban Science and Engineering
• Center of Studies in Resources Engineering
• IDP in Climate Studies
• IDP in Education Technology
• IDP in Industrial Engg. & Operations Research
• IDP in Systems & Control Engineering
• IITB Desai Sethi Centre for Entrepreneurship (IDP)
• Industrial Design Center
• Shailesh J. Mehta School of Management
Academic programs and degrees

- Applied Statistics & Informatics
- Chemistry
- Geology
- Geophysics
- Mathematics
- Physics
- Aerospace Engineering
- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Mechanical Engineering
- Design
- Education Technology
- Entrepreneurship (minor)
- Humanities & Social Sciences
- Management
- Policy Studies
- Biomedical Engineering
- Biotechnology
- Climate Studies
- Computer Science & Engineering
- Energy Science & Engineering
- Environment Science & Engineering
- Geoinformatics & Natural Resources Eng.
- Industrial Eng & Operations Research
- Metallurgical Eng & Material Science
- Nanotechnology & Science
- Systems and Control Engineering
- Technology & Development
- Urban Science & Engineering
- Biotechnology
- Climate Studies
- Computer Science & Engineering
- Energy Science & Engineering
- Environment Science & Engineering
- Geoinformatics & Natural Resources Eng.
- Industrial Eng & Operations Research
- Metallurgical Eng & Material Science
- Nanotechnology & Science
- Systems and Control Engineering
- Technology & Development
- Urban Science & Engineering

BTech, BS, PhD, MTech, MSc, MDes, MMgmt, MPhil
Dual degree programs (BTech+MTech, MTech+PhD, MTech+MSc, MSc+PhD,)
Minors and Honors for BTech students
Research Centers @ IIT Bombay

- Biomedical Engineering and Technology Incubation Centre [RGSTC, Maharashtra Govt + DST]
- Centre for Aerospace System Design & Engineering [ARDB + MoD]
- Centre for Formal Design and Verification of Software [DAE]
- Centre for Computational Engineering and Science [DAE]
- Centre of Excellence in Nanoelectronics [MCIT]
- Centre of Excellence in Steel Technology [MoSteel]
- Centre of Propulsion Technology [DRDO]
- Forbes Marshall Energy Efficiency Laboratory [Industry]
- Geospatial Information Science and Engineering (@CSE) [DST]
- National Centre for Aerospace Innovation and Research [DST, NAL, HAL, Boeing, DMG Mori, Sandvik, DelCam]
- National Centre for Mathematics (with TIFR) [NBHM, DAE]
- National Centre for Photovoltaic Research and Education [MNRE]
- National Centre of Excellence in Technology for Internal Security [MEITY]
- National Mission on Education through ICT [MHRD]
- National Solar Thermal Research, Testing and Simulation Facility [MNRE]
- Power Anser Laboratory [TCS + TCE]
- Tata Center for Technology Development [Tata Trusts]
- Tata Teleservices - IIT Bombay Centre of Excellence in Telecommunication [Tata Teleservices]
- Wadhwani Research Center for Bioengineering [Alumnus]
Research Centers @ IIT Bombay

- Healthcare Research Consortium
- Forbes Marshall Energy Efficiency Laboratory
- National Centre for Mathematics
  A joint center of TIFR and IIT Bombay
- Wadhwani Foundation
- IITB-TTSI Center for Excellence in Telecom
- National Centre of Excellence in Technology for Internal Security
- Indian Institute of Technology Bombay
- Centre for Formally Specified Systems
- Centre for Formal Design and Verification of Software
- NCPRE
- Tata Centre Technology and Design, IIT Bombay
- National Solar Thermal Research, Testing and Simulation Facility
- Advanced Research Lab
- National Mission on Education Through ICT
- CASiDE
- CoEST
  Centre of Excellence in Steel Technology
- BETiC
Research & Development @ IIT Bombay

1141 (928 Journals + 213 Conference proceedings)
- Number of research publications upto July 2016

82
- Number of companies incubated so far

101 (78 Indian + 23 Foreign)
- Number of patent applications filed upto Nov 2016

34 (29 Indian + 4 Foreign)
- Number of patent applications granted upto Nov 2016

325
- Number of PhD degrees awarded in 2016

2190 (1073 UG + 1117 PG)
- Number of other degrees awarded in 2016
Partnership with Industry

- Seek help to solve specific problems
- Sponsor laboratories, students
- Deploy IPs
- Support basic research for knowledge creation
- Carry out industry relevant research
- Human resource development
- Train industry personnel
- Seed high-tech spin offs
- Exploit complementarity
- Form Consortia
  Visits of Scientists and Engineers
Industry Collaboration
**Industry Collaboration (contd.)**

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<td>Nodal unit that manages and coordinates all R&amp;D activities at IITB including sponsored and consultancy projects, IP protection, technology transfer, dissemination.</td>
<td>Promotes and strengthens engagement with Alumni and Corporations. Manages utilisation and enhancement of IITB’s endowments and gifts from well-wishers.</td>
<td>Engages in developing a strategy to identify, engage and maintain active relationship with alumni. Works with the IITB Alumni Association to oversee and support the work of global alumni chapters.</td>
<td>Responsible for campus placements at IITB. Excellent infrastructure to support every stage of placement process.</td>
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### Industry Collaboration (contd.)

| **IIT Bombay Research Park** | • Establish an innovation hub through industry-academia collaboration  
|                           | • Enable 2-way flow of knowledge & resources  
|                           | • Creation of joint IITB-Industry R&D groups for stronger impact |
| **Office of the CEP (Continuous Education Program)** | • Assists working professionals in widening their knowledge base and improving skills  
|                           | • Helps make Indian industries globally competitive by providing training in critical and cutting edge areas |
| **Society for Innovation & Entrepreneurship (SINE)** | • Technology business incubator of IITB  
|                           | • Platform to support technology start-ups founded by IITB community and/or based on IITB technologies |
### Modes of Industry Interaction

#### Consultancy Projects (through IRCC)
- Short term projects to solve specific problems of industry, lasting 1-2 years
- Expected results at the end of the project are jointly defined at the beginning

#### Sponsored Projects (through IRCC)
- Long term projects for knowledge generation in current, emerging and futuristic areas, lasting 2-5 years
- Deliverables include IP generation, manpower and publications
Industry – IIT Bombay Research Cell (through IRCC)

- Long term
- Broad areas by Industry
- Fixed funding commitment
- On-the-fly access to data
- Project cycles
- IP: Joint ownership
- Licensing: mutually agreed T&C

Well Structured Governance Mechanism

- Advisory Committee
- Management Committee
- Principal Investigator

Modes of Industry Interaction (contd.)
Modes of Industry Interaction (contd.)

**Vision**
- Achieve recognition for innovation, entrepreneurship and research excellence through industry-academia collaboration

**Mission**
- Establish an innovation hub via industry-academia collaboration
- Enable two-way flow of knowledge and resources
- Create joint IITB-industry R&D groups for stronger impact
- Provide a platform for fostering entrepreneurship

Through the office of the Professor-in-Charge, IIT Bombay Research Park
Sponsor PhD and Masters Students
[through IRCC & Academic Office]

- Jointly promote research and manpower development
- INDUSTRY can sponsor students to work in an area of its interest
- Sponsorship includes monthly stipend (amount not less than that given by Govt. funding agencies) and a contingency grant

Sponsored Research Laboratory
[through IRCC or Dean (ACR)]

- INDUSTRY can sponsor a research facility or a laboratory in an area of interest and help in building the infrastructure at IITB
- Such facilities and laboratories will be shared with the sponsoring industry and may also be open to others on a case-to-case basis
### Chair Professorships (through IRCC)

- INDUSTRY can sponsor ‘INDUSTRY Chair Professor’, a distinguished academic position in the Institute.
- Selection of IITB faculty for this Chair Professorship will be as per IITB norms.
- INDUSTRY can have representation in the selection committee.
- ~20 chairs established currently with donations from alumni & industries.

### Pre-Competitive Consortia (through IRCC)

- Enables resource pooling for research in emerging areas.
- Partner with IITB through a consortia for mutual benefit of all stakeholders.
- Industry - Academia - Govt. consortia also possible.
Modes of Industry Interaction (contd.)

- Faculty as Visiting Scientists
- Student internships
- Scientists & Engineers as Visiting Faculty
- IITB
- Industry
Widen knowledge base, improve skills of working professionals

Provide training in critical areas

Can be short term or long term

Slow paced to accommodate other commitments

Can be in-house or @ IITB

Towards making the Indian industry globally competitive

Foster learning as a vehicle for innovation and growth

Open new areas of cooperation & collaborations

Strengthen industry – IITB interactions
Commercialization of IIT Bombay IP

- IIT Bombay has several patents (filed as well as granted)
- Seeking entities for large scale deployment and commercialization
- Hand-holding in the initial stages to understand the technology + nuances

**Technology Business Incubator (SINE)**

- Joint ownership of IP
- First right of refusal

**Modes of commercialization**

- Collaborative development and licensing
- Incubation / entrepreneurship
- Licensing of IP generated in the Institute
- Seek licensees Exclusive or non-exclusive licensing
- **Technology Business Incubator (SINE)**
Society for Innovation and Entrepreneurship (SINE)

- Technology Business Incubator of IIT Bombay set up in 2004; a not-for-profit entity
- Facilitates conversion of IIT Bombay R&D into commercial entities
- Helps in building business models / plans, fund raising, approaching clients
- Governing Board members includes IIT Bombay faculty and industry experts
- Incubate companies that have a potential to create economic growth and/or have a strategic or social value
- Intellectual property created by IIT Bombay faculty, students, staff, alumnus
Equipped with R&D strengths in the following broad areas of Management:

**Economics**
- Economic Environment of Business
- Industrial Economics
- Economics of Industrial and Urban Pollution
- Policy Analysis

**Finance Management & Accounting**
- Corporate Finance
- Capital Markets
- Mergers and Acquisitions
- Security Analysis and Portfolio Management
- Corporate Disclosures
- Corporate Governance
- Indian Business Model
- Financial Inclusion

**General Management**
- Entrepreneurship
- Intellectual Property Management
- International Business - Emerging Economies
- Innovation Management
- Knowledge Economy
- Management of New Ventures and SMEs

**Human Resource Management**
- Organizational Behavior
- Entrepreneurial Management
- Leadership and Performance Management
- Knowledge Management
- Positive Organization Behaviour
- Spirituality and Yoga in Management
Equipped with R&D strengths in the following broad areas of Management:

**Operations Management**
- Production Planning
- Manufacturing Strategy
- Quality Engineering and Management
- Supply Chain Management
- Discrete Optimization
- Warehouse Logistics
- Project Management
- Technology Management

**Quantitative Techniques and Applied Operations Research**
- Pattern Recognition
- Statistical Quality Control
- Supply Chain Modeling
- Fuzzy Optimization and Multi-objective Decision-making

**Marketing Management**
- Market Research and Consulting
- Consumer Research
- Branding
- Competition Research
- Marketing Communications
- Media Studies

**Strategic management**
- Industrial Competitiveness
- Growth Strategies
- Strategic Transformation
• SJMSOM offers Master of Management and PhD programmes
• Has recently launched an Executive MBA, jointly with the Washington University at St. Louise, USA
• Offers in-house training similar to CEP
To improve productivity - streamlining process flow and plant layout

- Improve supply and value chain operations
  - Inventory management
  - Logistics (both inbound as well as distribution)
  - Improved service levels, particularly for service industries

www.ieor.iitb.ac.in
Thank You

Industry Liaison team - industry@ircc.iitb.ac.in