Profile of the Departments

Department of Architecture

Birla Institute of Technology, Mesra, Ranchi, established the Department of Architecture in 1993. It is the only institute in Jharkhand offering Council of Architecture (COA) and All India Council of Technical Education (AICTE) approved undergraduate course in architecture (B.Arch), Institution of Planners, India (ITPI) recognized post-graduate course in urban planning (MUP) and PhD program in both Architecture and Urban Planning. The Department has the rare feat of being the first ever academic institute of Architecture to be awarded research grants under the Department Research Support (DRS) level of the Special Assistance Program (SAP) of the University Grants Commission (UGC).

Programs offered	Course Duration	Sanctioned intake
Bachelor of Architecture (BArch)	5 Years (10 Semesters)	40
Master of Urban Planning (MUP)	2 Years (4 Semesters)	20
Doctoral program in architecture and planning (Ph.D.)	-	-

The Architecture Department closely cooperates with various State Government Departments and organizations of the Government of Jharkhand, related the field of Urban Development, Building Construction, Disaster Management and 'Administrative Training Institute'. Faculty members find representation in various committees of the State Government related to Architecture and Urban Planning and provide professional consultancy services as and when sought. They are also resource persons for various QIP and capacity building activities of the State Government and help in organizing and conducting seminars and workshops.

Vision of the Department: The Department has the vision to produce both Architects and Urban Planners with originality, creativity, along with aesthetic values embedded with execution mechanism: a holistic approach to make a better world for all of us to live in.

Mission of the Department: The Department aims to serve the community and students better, and thus intends to take up the following as its mission:

- To dedicate for serving the community through commitment and state of the art learning environment.
- To create and promote dynamic institution that keeps pace with the demands of the modern Architectural Industry.
- To play a pivotal role in the development of emergent research culture through PhD program.
- To enrich the design disciplines so as to create ample opportunities to collaborate with the present-day requirement of building industry.
- To outreach to industry by hiring some of the brightest and most talented practicing Architects as visiting/part-time teachers.
- To create a mixed culture of research and industry driven approaches for both the faculty and student.
- To help the students to develop a knowledge base that leads them towards the lifetime goal of both personal and professional front.

About the Courses: Architecture is primarily the art and science of designing spaces for serving the multifarious activities and specific needs of human beings in a meaningfully built environment. Also, the architectural profession calls for originality, creativity, conceptualization, perception, aesthetic values and a holistic judgment of people, places, objects and events. The course structure is therefore designed to sensitize the students to fulfill the above requirements of the profession and incorporates philosophic wholesomeness of humanities, the logical rationalism of science, the passionate imagination of art and the inexhaustible resources of technology.

The post-graduate course in Urban Planning (MUP) program is likewise designed to fulfill the great need of formal training requirement for holistic fulfillment of the duties of urban local bodies in the area of urban development, planning, town planning schemes and implementation of such development plans or living in urban settlements and various tools and techniques used for planning and management of the development process.

Research and innovation are important hallmarks of any world class university. Architecture Department has infrastructures and facilities for advanced research in the field of Architecture and Urban Planning. A number of Ph.D. degrees have been awarded besides a large number of scholars, registered for the ongoing Ph.D. in both the disciplines.

Ranking of the Department: The Architecture Department has ranked 10 among all Architecture colleges in India as per NIRF 2019. *The Department ranked 6th among all colleges of Architecture in India as per India Today 2019 survey.* **The Department ranked 2nd among all colleges of Architecture in India as per the survey of** GHRDC **in 2019. Department has been constantly featuring as one of the top 10 Architecture Departments in the Country for last decades.**

Faculty of the Department:

The Department has highly qualified and competent faculty members. The faculty members contribute to the development of the subject area through consultancy, research activities and contributing research papers and articles in national and international journals. They constantly engage themselves and stay abreast with up-to-date academic development through participation in short term courses, seminars, conferences and workshops. They were involved in development of e-content for six architectural subjects at the under-graduate level, a project funded by MHRD "National Mission Project on Education through ICT: Developing suitable pedagogical methods for various classes, intellectual calibers and e-learning" anchored by IIT, Kharagpur.

Department of Bio-Engineering

The Department of Bioengineering, renamed in 2014, was established in 2002 as Department of Biotechnology with financial support from the Department of Agriculture, Government of Jharkhand, with objectives like providing education and training facilities, carrying out application oriented research, developing in-house technologies and promoting consultancy services in various areas of Biotechnology.

Programs Offered	Course Duration	Sanctioned Intakes
B.Tech. Biotechnology	4 Years (8 Semesters)	30
M.Tech. Biotechnology	2 Years (4 Semesters)	18
M.Sc. Biotechnology	2 Years (4 Semesters)	30
Ph. D. Program	-	-

CBCS have been adopted in 2018 for all UG and PG programmes. All the programs are approved by All India council for technical education (AICTE).

The Vision & Mission of the Department are: -

Vision of the Department:

- The Department of Bioengineering has a vision to impart international standard quality education in the field of Bioscience, Biotechnology and Bioengineering.

Mission of the Department:

- To create state-of-the-art infrastructure for Research and Training in Biotechnology and Bioengineering.
- To provide globally acceptable technical education in Bioscience, Biotechnology and Bioengineering.
- To nurture graduates for innovation and creativity in the field of Bioscience, Biotechnology and Bioengineering having ethical and social concern.
- To promote collaboration with Academia, Industries and Research Organizations at National and International level.
- To contribute to socioeconomic development through education and bio-entrepreneurship

The different programmes seek to provide students with education and training in:

- Scientific principles and knowledge underlying advances in bioengineering
- Basic laboratory techniques in research and development
- Legal and intellectual property issues
- Tools involved in bioinformatics, imaging and signal processing
- Skill and attributes important in business and bio-entrepreneurship

Further the learning approach encourages team spirit and leadership quality among students to prepare them for challenging careers, including:

- Research positions in laboratories
- Biotech industries including biopharmaceuticals, medical devices
- Careers in biotechnology applications
- Management positions in bioengineering sector
- Careers with Law firms in biotechnology
- Software development and management

Department at a Glance:

- Independent building about 35000 sq. ft.
- 12 well equipped high end research laboratories dedicated to carry out basic and advanced research in the field of Molecular Biology, Genetic Engineering and Cell Biology, Plant and Animal Biotechnology, Microbiology, Biochemistry, Proteomics, Bioinformatics, Bioprocess Engineering, Chemical Engineering, Environmental Biotechnology, Biomedical Instrumentation and Imaging.
- A Center of Excellence (CoE) under TEQIP, Phase II sponsored by World Bank, BTISnet SubDIC Bioinformatics centre for Jharkhand.
- More than 50 externally funded projects from funding agencies like DST, DBT, DST-SERB, UGC, AICTE, ICMR, CSIR, NAIP, MoFPI etc.
- A mixed and balanced well recognized faculty members with rich academic and research profile.
- All academic faculty members hold PhD degree and vary in their field of specialisation. Department provides high end computational software / platform for students.

Department of Chemical Engineering

The Department of Chemical Engineering with well qualified faculty provides high standard of education in the diversified fields of Chemical Engineering and Chemical Technology. The Department received national recognition by winning the Gold Trophy for Plasticon Award 2012 in the category of Best Educational Institution Contributing to Plastics. The Plasticon Award was conferred on 1st February 2012, at 8th International Plastics Exhibition and conference. The program was supported by Ministry of Chemicals and Fertilizers, Department of Chemicals and Petrochemicals, Government of India. Faculty members are working on sponsored projects and collaborative research with various organizations. The Department is also recognized under DST-FIST. Department is recipient of a major grant from Ministry of Food Processing Technology, Govt. of India, for infrastructure development for programs in Food Technology.

Programs Offered	Course Duration	Sanctioned Intake
B.Tech. in Chemical Engineering	4 Years (8 Semesters)	60
B.Tech. in Chemical Engineering (Plastic & Polymer)	4 Years (8 Semesters)	30
Integrated M.Sc. (Food Technology)	5 Years (10 Semesters)	30
Ph.D. Program		

Vision of the Department:

To be a centre of excellence for the provision of effective teaching/learning, skill development and research in the areas of Chemical Engineering and allied areas through the application of Chemical Engineering principles.

Mission of the Department:

- To educate and prepare graduate engineers with critical thinking skills in the areas of chemical engineering & polymer science and engineering, who will be the leaders in industry, academia and administrative services both at national and international levels.
- To inculcate a fundamental knowledge base in undergraduate students which enable them to carry out post-graduate study, do innovative interdisciplinary doctoral research and to be engaged in long-life learning.
- To train students in addressing the challenges in chemical, petrochemical, polymer and allied industries by developing sustainable and eco-friendly technologies.

The undergraduate program B.Tech. (Chemical Engineering) and B.Tech. (Chemical Engineering-Plastics and Polymer) imparts high standard training, emphasizing on Chemical Engineering fundamentals - Heat Transfer, Mass Transfer, Fluid Flow, Process Control, Reaction Engineering, Computer Aided Engineering etc to groom them to carry out economic and environment friendly design, technology development and operation of a wide range of chemical plants – Industrial chemicals, petroleum, polymer material, processing, composite material, cement, fertilizer, fuel etc. The core curriculum is complemented by electives in the important emerging areas like Nanotechnology, Biotechnology, Food Technology, Polymer Engineering, Energy Engineering etc.

Food Processing Industry in India is growing at a very fast pace. Envisaging a great demand for qualified food technologists in our country, from 2014 academic year with support from Ministry of Food Processing Industries 5 year Integrated M.Sc. (Food Technology), with exit option as well as lateral entry after three years, has been introduced. The courses include training in the area of Food Composition and Chemistry, Food Biochemistry and Human Nutrition, Food Microbiology, Food Plant sanitation, Food Analysis and Quality Control, Food Preservation and Processing Technology, Chemical Engineering unit operations in Food Processing Industries, Food Packaging, Post-Harvest Technology etc.

The Department also offers facilities for Ph. D. program in fields of i) Chemical Engineering, ii) Polymer Science and Technology and iii) Food processing and Technology.

Apart from standard Chemical Engineering laboratories like Fluid Flow, Heat Transfer, Mass Transfer, Reaction Engineering, Process Control etc. the Department of Chemical Engineering has state of the art facilities for Post Graduate and Doctoral Research in Reaction Engineering, Instrumental Analysis of chemicals and Polymer, Polymer Processing, Product Development Laboratory etc. The major facilities include computer controlled reactors, Haake Minilab Micro Compounder and Haake Minilab micro injection Moulding, Air Bearing Rotational Rheometer, Malvern, HAAKE Torque Rheometer with Mixer and Extruder, Oscillating Disc Rheometer, Instron Tensile Testing machine, ATLAS accelerated weathering system, Dynamic Mechanical Thermal analyzer (TA), Gas Chromatograph. The Polymer Processing and Product development facilities include Injection Moulding machines - 80 ton L&T Ergotech and 25 ton Windsor, Extrusion Blow moulding machine with parison programming, Kolsite Single screw extruder, Kolsite Film blowing plant and PVC pipe Extrusion plant, Two roll mixing mills, Thermoforming, Compression moulding, Welding facilities – Ultrasonic and Hot air, 3 axis CNC EDM machine etc.

The students are trained in various CAE applications ASPEN Plus, Accelerys -Material Studio for molecular simulation, MATLAB, PROENGINEER, ANSYS, CATIA, FLUENT, POLYFLOW, MOLDFLOW etc. E-learning facility has been created with Paulsons Training Basic Injection Moulding, Simtech, Single Screw Extrusion, and Compounding with Twin Screw Extruder.

Laboratories in the area of Food Technology include Food Processing Laboratory, Food Microbiology Laboratory, and Food Analysis Laboratory. The Food Processing Laboratory includes Pulper machine, vegetable dicing machine, Juice Extraction, Homogenizer, Twin Screw Extrusion cooker, Homogenizer, Colloidal Mill, Grinders, Can Body Reformer, Canning Retort, Steam generator, Steam jacketed cooker, Tray dryer, fluidized bed dryer, Vacuum bottle Filling machine, Form Fill and Seal packaging etc. Food Microbiology lab with Autoclave, Laminar flow clean air workstation, BOD incubator has the expertise of microbiological tests of water and food. The Food Analysis and quality Control facilities included Flame photometer, HPLC, Digital colorimeter, NIR Spectral Analyzer, UV-VIS Spectrophotometer etc. The other required equipment are available in Central Instrumentation Facility are also available. The facilities are being augmented with capability for determination of protein by Kjeldahl method, dietary and crude fibre determination, Fat determination, Food Texture Analysis, Atomic Absorption Spectrophotometry, Spray drying, etc.

RESEARCH AREA:

Nanoparticle synthesis, Catalysts, Advanced Polymer Composites, Alternative Energy, Pollution Control, Water Treatment Technologies, Polymer Blends and Interpenetrating Polymer Networks, Nano filtration Membrane, Recycling of Polymer Waste, Specialty Polymer, Colloids and Interfacial Science, Tissue Engineering, Sensors, Fuel Cell Membrane etc.

Department of Chemistry

Department of Chemistry was established in 1955, offers undergraduate, postgraduate & Ph.D. programs in chemistry. The Department has received support under "Fund for Improvement in Science & Technology Infrastructure" (FIST-2012) program of the Department of Science and Technology, New Delhi for NMR and Computational Chemistry facility. The Department is actively involved in promoting environmental awareness amongst the tribal and rural population in Jharkhand. The Department is committed to high quality research programs supported by UGC, DBT, CSIR, AICTE, UNICEF and World Bank in major thrust areas like Fuels & Energy, Nonlinear Chemical Dynamics, Frontal Polymerization, Electrochemical Machining, Organic and Molecular Synthesis, Environmental controls and monitoring, Nanotechnology and Computational Chemistry.

Programs Offered	Course Duration	Sanctioned Intake
M.Sc. in Chemistry	2 Year (4-Semesters)	15
Integrated M.Sc. in Chemistry	5 years (10- Semesters)	30
Ph.D. program		

Vision of the Department:

To become a recognized centre of excellence for teaching, research and innovations and make significant contribution for producing academic professionals and entrepreneurs in frontier area of chemical sciences.

Mission of the Department:

- To impart quality education and fundamental concepts of chemical sciences to students & scholars through our state of art laboratory, teaching and research facilities
- Building a scientific environment and motivation towards innovation with quality research in chemical sciences and interdisciplinary areas

Program Educational Objectives

- To impart high quality education and research to develop future academicians, scientists and technocrats for national needs
- To nurture professional graduates to develop capability in analysing real life problems of chemical sciences
- To foster attitude towards continuous learning for improving the talents for research, academia and industry
- To improve professional skills for achieving the academic goal

Program Outcomes

- Ability to explore knowledge in solving the practical problems of chemical science independently
- Ability to compete national level Tests such as UGC-CSIR NET, GATE, etc., for higher studies and research
- Ability to explore academic acquaintancy at par with global standards
- Comprehending the technological challenges and advancements in the subject of chemistry through continuous learning process
- An ability to write and present problems and findings their solution through scientific approaches

Research Facilities

- The Department is equipped with state - of - art instruments and research facility to meet the requirement of modern day chemistry
- The Department has a unique research facility of Nuclear Magnetic Resonance (NMR) spectroscopy, 400 MHz, JEOL which fulfil the requirements of solution-state analytical needs for both students and researchers.
- Advanced equipment such as AUTOLAB workstation, Electrochemical Analyzer (CHI), Microwave Reactor, UV/VIS/NIR Spectrophotometer, Solar Simulator, Rotational Viscometer, Ultra Low Immersion Chiller, Digital Osmometer, XYT Chart Recorder, Millipore, Refractometrer, Ultra Low etc., are available for training and research.
- Department has a computational lab facility for conducting training and research in the area of theoretical and computational chemistry.

Department of Civil and Environmental Engineering

The Department of Civil Engineering was established in 1957. It was renamed as Department of Civil and Environmental Engineering in 2014. There are well established laboratories in the department. The faculty members are well qualified and are having degrees from reputed Institutes. They are actively involved in research and consultancy. The department had contributed a lot in the infrastructural and industrial growth in Jharkhand by providing technical expertise and consultancy.

Programmes Offered		Course Duration	Sanctioned Intake
B.E. in Civil Engineering		4 Years (8 Semesters)	60
M.Tech. in Civil - in two specializations	a) Soil Mechanics & Foundation Engineering	2 Years (4 Semesters)	12
	b) Structural Engineering	2 Years (4 Semesters)	12
M.Tech. in Environmental Science & Engineering		2 Years (4 Semesters)	18
Ph.D. Programme		-	--

The following are the important research areas in which faculty members and research scholars are working.

Air Pollution, Applied Hydrology, Bioremediation, Composite Materials, Concrete Structures, Durability of Concrete, Geo-environmental Engineering, Groundwater Flow Modelling, Groundwater Quality Management, Heavy Metal Pollution, Intelligent Modelling in Geotechnical Engineering, Mine Slope Stability Analysis, Open Channel Hydraulics, Pavement Materials, Soil Stablisation, Solid Waste Management, Structural Dynamics, Wastewater Treatment, Water Quality Assessment.

Vision of the Department:

- To develop quality intellectuals through education, research and motivation so that they could bring a positive contribution to society in the area of civil and environmental engineering.

Mission of the Department:

- To develop professional skills through quality education and research.
- To outreach various sectors of society through interdisciplinary programmes and practical oriented approach.
- To create dynamic, logical, and effective leaders with inspiring mind sets.

About the Programmes:

M.Tech. Soil Mechanics & Foundation Engineering

Programme Educational Objectives

1. To impart students with strong knowledge base through theory courses & sessionals in Soil Mechanics & Foundation Engineering that makes them suitable for industries, academics, research & consultancy.
2. To enrich research and practices, by inspiring the leaders of tomorrow to take on the challenge with ease and confidence.
3. To train the students on developing practical, efficient & cost effective solutions on problems & challenges on Soil Mechanics & Foundation Engineering.
4. Implant sensitivity towards ethics, public policies and their responsibilities towards the society.

Programme Outcomes

The Students will develop ability

1. An ability to independently carry out research /investigation and development work to solve practical problems.
2. An ability to write and present a substantial technical report/document.
3. Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
4. To apply in-depth knowledge gained during the PG Soil Mechanics and Foundation Engineering program in analysing and interpreting real life problems for providing the optimal and achievable solutions considering its technical, professional, and ethical aspects.
5. To enable him/ her in identifying &understanding the impact of Geotechnical Engineering problems and their solutions in global, economic, environmental, and social context.
6. To learn and unlearn throughout his professional career, and be willing to learn new techniques, methods and processes related to Geotechnical Engineering from simple to complex, with an understanding of the associated limitations.

M.Tech. in Structural Engineering: Programme Educational Objectives

1. To impart students with strong knowledge base through theory courses and sessional that makes them suitable for industries, academics, research and consultancies.
2. To develop students analytical, computational and research skills through assignments, weekly presentations and modelling software.
3. To train the students on developing practical, efficient and cost-effective solutions on problems and challenges on structural engineering.
4. To inculcate among student's sensitivity towards social and corporate responsibilities.

Programme Outcomes

1. An ability to independently carry out research /investigation and development work to solve practical problems.
2. An ability to write and present a substantial technical report/document.
3. Students should be able to demonstrate a degree of mastery for designing and solving structural engineering problems.
4. An ability to use appropriate modern tools in structural engineering. In doing so he should demonstrate sufficient knowledge of competing tools and their relative merits and demerits.
5. An ability to demonstrate the traits of learning and unlearning throughout his professional career, and be willing to learn new techniques, methods and processes.
6. Tune his knowledge to be a responsible engineer adhering to all established practices of his profession.

M.Tech. in Environmental Science & Engineering: Programme Educational Objectives

1. To impart students with strong knowledge base through theory courses and sessional that makes them suitable for industries, academics, research and consultancies.
2. To develop students analytical, computational and research skills through assignments, weekly presentations and modeling software.
3. To train the students on developing practical, efficient and cost effective solutions on problems and challenges on environmental sciences and engineering.
4. To inculcate among students sensitivity towards social and corporate responsibilities.

Programme Outcomes

1. Develop an ability to independently carry out research /investigation and development work to solve practical problems.
2. Develop an ability to write and present a substantial technical report/document.
3. Acquire a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
4. Acquire in-depth knowledge about various environmental processes, analyze and design solutions for complex problems related to environmental and public health.
5. Be able to critically evaluate environmental sustainability and sensitize communities through effective communications and assess alternative solutions for adequate decision making for overall environmental management.
6. Acquire professional and intellectual integrity and ethics to produce socially responsible and competent environmental scientists and engineers.

Department of Computer Science & Engineering

The Department of Computer Science & Engineering was established in the year 1983 and is now recognized as one of the leading departments with infrastructure and facilities to match the very best in the country. The department remains committed towards its mission, which is twofold. One is to provide students with the fundamental knowledge and problem-solving skills in Computer Science required for a fulfilling career. The other goal is to create and disseminate knowledge to improve Computer Science research, education and practice.

Link : https://www.bitmesra.ac.in/Show_Department_Section?cid=1&deptid=70

The department currently offers the following programs, all of which are approved by the All India Council for Technical Education (AICTE).

Programs Offered	Course Duration	Sanctioned Intake
B.Tech. in Computer Science & Engineering	4 Years (8 Semesters)	180
B.Tech. in Information Technology	4 Years (8 Semesters)	60
Master of Computer Applications (MCA)	2 Years (4 Semesters)	60
M.Tech. in Computer Science & Engineering	2 Years (4 Semesters)	16
M.Tech. in Information Technology	2 Years (4 Semesters)	18
M.Tech. in Information Security	2 Years (4 Semesters)	18
Ph.D. Programme	-	-

Vision of the Department:

The department strives to be recognized for outstanding education and research, leading to excellent professionals and innovators in the field of Computer Science and Engineering, who can positively contribute to the society.

Mission of the Department:

- To impart quality education and equip the students with strong foundation that could make them capable of handling challenges of the new century.
- To maintain state of the art research facilities and facilitate interaction with world's leading universities, industries and research organization for constant improvement in the quality of education and research.

Research Areas (Not limited to)

- Digital Image Processing
- Parallel Computing
- Soft Computing (Rough Sets & Near Sets, Fuzzy Sets, Neural Network)
- Machine Learning
- Natural Language Processing
- Information Retrieval
- Software Engineering
- Pattern Recognition
- Bigdata Analysis
- Network & Security

Facilities available:

The department is equipped with nine laboratories with over 450 computers available for conducting laboratory sessions in diverse topics like –

i). Programming languages: C, C++, Java, and Oracle.
ii). Matlab for Soft Computing and Image Processing.
iii). Rational Rose for Software Engineering.
iv). LDRA Centre of Excellence for Software Testing.
v). Laboratories for Networking, Multimedia, Simulation, Parallel Computing, IoT, Machine Learning, High Performance Computing, Intelligent Systems etc.

All the Laboratories are internally networked allowing students to remotely access resources at any point in time. The department has a **HPC Server** (**Master Node**- 2 no of Intel Xeon E5-2630 v3 2.4GHz processors with 8 core and 64 GB memory, 2*1 TB HDD, **CPU Compute Node**-2 no of Intel Xeon processor E5 2630 V3@ 2.4 GHz with 8 core in each processor and 64 GB memory, 500 GB Disk capacity FDR infiniband, **GPU Compute Node-** 1 no of GPU node with 2 no of Nvidia K20 GPU with node specifications of 2 processor(Each 8 core) and 64 GB memory. 2 Nos 500 GB HDD, FDR InfiniBand, **Cloud Node**- 1 processors E5-2620 V3@2.4 GHz,6 core and 64 GB Memory, 1 TB HDD, Dual Port FC HBA, **Storage(for HPC and Cloud)**- 48 TB of RAW capacity to be shared via NFS over infiniBand for the entire cluster from Master node. The same storage in partition mode is be used for cloud also), HP Proliant ML 370 Server, Dell Poweredge Sever which provides support to numerous departmental and inter departmental research activities.

Faculty Strength

Highly experienced faculties with PhD from premier institutes of India & Abroad in various disciplines.

Placement Record

- In 2018-19, 121 recruiters across the campus visited and offered 915 positions.
- The average salary was INR 10.34 lakhs per annum and the highest national offer was 40.63 lakhs per annum for B.Tech program. For M.Tech program the average salary was INR 4.90 lakhs per annum and the highest national offer was 9.68 lakhs per annum. And for MCA, the average salary was INR 5.25 lakhs per annum and the highest national offer was 8.05 lakhs per annum. Most of the CSE students got 2 jobs through campus.

Department of Electronics & Communication Engineering

The Department of Electronics and Communication Engineering was established in the year 1960 and has been very actively and successfully involved in imparting teaching/training, supervision and motivation to undergraduate, post graduate and doctoral students. The Department of Electronics and Communication Engineering is one of the largest departments of the institute having largest student and faculty strength. Due to its modern infrastructure and exposure given to the students, it is one of the elite departments in India. There are several ongoing/completed sponsored projects from DST, SERB, DRDO, ISRO, MHRD, MeitY, and DBT etc. The department is supported by TEQIP fund for attending workshop, conference (national & international), developing laboratories. etc. The department has been identified for Center-of-Excellence.

Programs Offered		Course Duration	Sanctioned Intake
B.Tech. in Electronics & Communication Engineering Minor in - Signal Processing - Wireless Communication and Networking - Microwave Engineering - Electronic Instrumentation - VLSI Systems		4 Years (8 Semesters)	120
M.Tech. in Electronics & Communication- in 3 specializations	a) Instrumentation	2 Years (4 Semesters)	12
	b) Microwave	2 Years (4 Semesters)	12
	c) Wireless Communications	2 Years (4 Semesters)	18
Ph.D. Program		-	-

Vision of the Department:

To become a centre of excellence in teaching and research for creating technical manpower to meet the technological, societal and environmental needs of the country in the field of Electronics and Communication Engineering.

Mission of the Department:

1. To offer state of the art education of global standards through innovative methods of teaching and learning with practical orientation aiming to prepare the students for successful career and to provide required technological services.
2. To prepare the students to think independently, take initiative, lead a team in an organization, take responsibility and solve the problems related to industry, society, environmental, health, safety, legal and cultural issues maintaining the professional ethics.
3. To pursue high quality contemporary research through continued interaction with research organizations and industries.

Bachelor of Technology:

The Department has implemented Choice Based Credit System(CBCS), where have students versatile facility to opt the industry or research oriented courses in the form of minor specialization. It exposes the undergraduate students to all fundamental and advanced technology in the field of Electronics and Communication. Some of the advanced papers offered in the curriculum are Fibre Optic Communication, Data and Computer Communication, Satellite Communication Systems, Mobile and Cellular Communications, Telecommunication Switching Circuits, Antenna and Wave Propagation, Optical Fibre Network, Intelligent Instrumentation, Bio-electronic Instrumentation, Advanced Microprocessor, Microelectronic Engineering, VLSI Design, Digital Signal Processing Architecture, Digital Image Processing, Random and Stochastic Processes, Information and Coding Theory etc. Besides these the students also learn various computer related papers. The syllabi are frequently updated to incorporate recent developments considering advancements achieved in the national and international scenario.

The Department has several well-equipped laboratories such as Fibre Optics Communication Lab, Microprocessor Lab, Advanced Communication Lab, Microwave Lab, VLSI Design Lab, Intelligent Instrumentation Lab, Antenna Lab, Circuit Simulation Lab, Wireless Networking Lab & Digital Signal Processing Lab, where students are given rigorous practical sessions. The students are also exposed to virtual laboratory simulation packages like MultiSim, CommSim, Ultiboard, MATLAB, LABView, HSPICE, Fidelity, NS-2, Cadence Design Tools, Xilinx's and Visual TCAD, VCU108 Kit as well as to hardware assembly and testing practices. Department has signed MoUs with Aarhus University Denmark and BSNL Ranchi for collaborative research and academic in advanced communication related research areas such as 5G radio & network and 3D printing of MmWave components.

This serves to help the students in gaining practical exposure to these developing technologies. Undergraduate students have to successfully complete a departmental project spanning 3 semesters. Seminars are presented by the students, which give them an opportunity to develop their communication skills. The culmination of these efforts has been the achievement of nearly 100% campus placement in various leading industries and organizations for the last many years.

Master of Technology:

The Department is currently running three postgraduate programs with specializations in (a) Instrumentation (b) Microwave (c) Wireless Communications.
The students are exposed to some of the specialized software tools such as Cadence design tools, IE3D, Microwave Office, Sonnet, Fidelity, Beampro, SystemView and NS-2 etc. apart from various other software tools like LABView and MATLAB.

The department has devoted and qualified expert team of faculty members, who are continuously, involved in various research activities. The department is recipient of UGC assistance of 52.5 Lacs in the form of "Departmental Research Support" under the "Special Assistance Program (SAP II)" of UGC. Several R & D projects are also being taken up by the faculty members of the department from various agencies like UGC, DST, AICTE, ISRO etc.

Around fifty full time/part-time scholars are registered in the department for Ph. D. program.

Focused research area:

Microwave and wireless communication: Microwave material characterization, Antennas, Filters, mm-Wave Tech., uW Imaging, EMI-EMC, 5G comm., Cooperative Cognitive Communication, SDR Networks.

Instrumentation and signal processing: Speech and Image Processing, Stochastic Signal and Biomedical Signal Processing, Sensors & Transducers, Advanced Instrumentation.

Optical communication: Visible Light Comm., MIMO, OFDM, Optical Networking, Optical Comb Filter, Fiber Optic Sensors.

Microelectronics and VLSI design: Nano Electronic Devices & Circuits, RF-Device Modeling, HEMT, Low Power VLSI, Power conditioning circuits, RF Circuit Design, MEMS sensor, transducers, Energy Harvester, RFMEMS.

Department of Electrical & Electronics Engineering

The Department of Electrical Engineering was started in 1955. The B.E. curriculum was redesigned in 1986 to accommodate several Electronics and Computer subjects in order to tune its programs according to changing requirements and since then it has been renamed as Electrical & Electronics Engineering. The Department is dedicated to the current needs of industry primarily focusing on application of new technology in various fields. As recognition of the activities of faculty members, different agencies like UGC, DST, AICTE, CDAC, TEQIP, etc have sanctioned funds to support the on-going research work.

Programs Offered		Course Duration	Sanctioned Intake
B.Tech. in Electrical & Electronics Engineering		4 Years (8 Semesters)	60
M.Tech. in Electrical Engineering in 3 specializations	(i) Control System	2 Years (4 Semesters)	12
	(ii) Power System	2 Years (4 Semesters)	12
	(iii) Power Electronics	2 Years (4 Semesters)	18
Ph.D. Program: At present 35 scholars are registered in Ph.D. Program of the Department			

Vision of the Department:

- To become an internationally recognized center of excellence in academics, research and technological services in the area of Electrical and Electronics Engineering and related inter-disciplinary field.

Mission of the Department:

- Imparting strong fundamental concepts to students and motivate them to find innovative solutions to engineering problems independently
- Developing engineers with managerial attributes capable of applying latest technology with responsibility
- Creation of congenial atmosphere and excellent facilities for undertaking quality research by faculty and students
- To strive for more internationally recognized publication of research papers, books and to obtain patent and copyrights
- To provide excellent technological services to industry for the benefit of society

Programs Accredited:

All the above courses are approved by AICTE. B.Tech. (EEE), M.Tech. (Control System) and M.Tech. (Power System) and M.Tech. (Power Electronics) programs are accredited by NBA.

Undergraduate Program:

The emphasis is given on fundamentals of science, mathematics and their application to the solution of contemporary problems. The program provides ample flexibility to the students to undertake various elective and breadth courses that provide exposure to various disciplines of EEE. The detail information about the course structure and syllabus is given in the website.

Electives offered:

Computer Aided Power System Analysis, Bio Electronics Instrumentation, Artificial Neural Network (ANN), Advanced Power Electronics, Robotics, High Voltage Engg., EHV Power Transmission, Artificial Intelligence, Soft Computing Techniques, Renewable Sources of Electrical Energy, Testing & Commissioning of Electrical Equipment, Embedded System & its Applications.

List of Breadth Papers:

Environment Psychology, Organisation Behaviour, Industrial Organisation & Management, Financial Management, Business Ethics, Intellectual Property Rights, Entrepreneurship & Small Business Management, etc.

Postgraduate Programs:

M.Tech. in Control System:

In M.Tech. Control Systems Programme focuses on cutting edge control techniques like modern control system, nonlinear control analysis, discrete control techniques, optimal control, robotics, ANN based adaptive control methods, fuzzy logic controllers with advanced model reference learning and stability analysis, etc.

M.Tech. in Power System:

M.Tech. Power systems aims at imparting knowledge on advanced analysis techniques, modern tools in power system operation and control, techniques to improve the performance of EHV AC and HVDC transmission, advanced power system protection systems, planning and reliability analysis, technologies involved with renewable energy sources, DSP applications, etc.

M.Tech. in Power Electronics:

M.Tech. Power Electronics emphasizes on imparting skilled knowledge of advanced semiconductor devices, power electronic converters, their design and control methodology, dynamics of Electrical Machines, Power Electronics applications, Control of electrical drives etc.

Ph. D. Program:

Currently a number of research scholars are working in the areas of non-stationary signal analysis, intelligent control techniques applied to Phasor Measurement Unit (PMU), Reliability analysis for power system and its components like PMU, Protection Systems, etc., Multi-Agent System (MAS) modelling, Wide Area Monitoring System (WAMS), Distribution System Planning, Automatic Generation Control and non-linear dynamic systems, Real-time Image processing for robotic application, development of new architecture for neural networks, soft computing based intelligent controller design, Fault diagnosis of 3 – φ Induction motor, bi-directional dc-to-dc converters, matrix converter, resonant converter, current source inverter for hybrid electric vehicles, control of induction motor drive, three-phase and multi-phase PM BLDC drive, estimation and identification of plants.

Research Activity:

The faculty members of the department (with different specializations) actively pursue research with funding from various national agencies like UGC, AICTE, DST. The current areas of research include Laboratory Prototype of Smart Grid, digital relaying of transmission using DSP techniques, reliability analysis, generation scheduling, distribution systems planning, voltage stability analysis, Fault tolerant permanent magnet drives, Energy Storage and Management, Grid Interactive Solar Photovoltaic System, Microgrid, bi-directional converters for contactless energy exchange, Image processing applied to vehicular traffic surveillance system, etc.

The research outputs are published in reputed journals like IEEE transactions, IET Proceedings, Elseveir, Taylor & Francis, Polish Academy of Science & Tech., IE (I), etc.

The department has also got two patents in the area of power systems.

Collaboration with Industries and Universities:

The department has collaborated with the Texas Instruments, NI, Research and Development Center for Iron and Steel (RDCIS), SAIL, Metallurgical Consultants Limited (MECON), Meditron (Ranchi), etc.

Conventions/Seminars/Conferences/Short-term Training Programs:

The Department regularly organizes conventions, seminars, conferences short term training programs/courses under aegis of AICTE- ISTE, TEQIP, UGC (FIST), NaMPET. Specialized courses for industry (SAIL, Indian Railways) have also been organized.
Keeping in view the development of nearby villages, the Department is also involved in conducting short term training programs in electrical technical skills to youth.

Facility:

The department has following well-equipped laboratories; Basic Electrical Engineering lab., Measurement Lab., Electrical Machines lab., Power Electronics lab., Electrical Drives lab., Control Systems lab., Process Control Lab., Power Systems lab., Smart Grid lab., Digital Signal Processing lab., Simulation lab., Electrical Workshop.

The main equipment in measurement lab are - Optical transducer, thermal transducer, Kelvin double bridge, LVDT setup, strain gauge setup, setup to determine breakdown voltage of transformer oil. Electrical Machines lab. houses all static and rotating machines like transformer, induction motor, DC motor, DC generator, synchronous generator (alternator) and motor.

The major equipment in power Electronics lab are - device characterization system, AC - DC, DC-DC, DC - AC conversion systems, Programmable signal generators, signal analyzer, etc.

The department is in the process of establishing a drive lab for enhancing research facility in the field of Power Electronics. The main equipment in Electric Drives Lab which is in the process of upgradation consist of single phase and three phase inverter, rectifier, BLDC Motor, DC Motor, three phase induction motor, etc.

Department of Mathematics

The Department of Mathematics was founded in 1956, under the name Department of Applied Mathematics. It started with only undergraduate program offering to engineering students. Mathematics play an important role in engineering and it is clearly reflected from the fact that it conducts all the mathematics courses offered in different branches of engineering, management, pharmaceutical sciences, architecture and the University polytechnic.

Programs Offered	Course Duration	Sanctioned Intake
M.Sc. in Mathematics -	2 Years (4 Semesters)	15
Integrated M.Sc. in Mathematics & Computing	5 Years (10 Semesters)	30
Ph.D. Program	-	-

Vision of the Department:

- To become a globally recognized centre of excellence in teaching and research, producing excellent academicians, professionals and innovators who can positively contribute towards the society.

Mission of the Department:

- Imparting strong fundamental concepts to students in the field of Mathematical Sciences and motivate them towards innovative and emerging areas of research.
- Creation of compatible environment and provide sufficient research facilities for undertaking quality research to achieve global recognition.

The department started its five-year integrated M.Sc. program in Mathematics and Computing in the year 2011 with the aim of imparting the knowledge of mathematics arising in real world problems with a strong focus on Computing. A similar Masters course, MSc in Mathematics, has also been running in the department to impart the knowledge of pure and applied mathematics among the students.

The courses in both the programs have been designed with special emphasis on applications of mathematics and computing. The courses, such as, Numerical Analysis, Advanced Operations Research, Fluid Dynamics, Advanced Differential Equations, Difference Equations, Mathematical Modelling, Mathematical Ecology in MSc Mathematics, and Data Structures, Fuzzy Logic, Computer System Architecture, Probability and Statistics, Financial Mathematics, Stastical Computing, Discrete Mathematics, Partial Differential Equations, Real and Complex Analysis, Numerical Techniques, Software Engineering, and several other courses designed in IMSc in Mathematics and Computing give a glimpse of the importance of the programs.

Our curriculum attracts several software companies, such as, Wipro, Infosys, Wipro Turbo, Capital float, Fastenal, PWC, Crisil, Cleartax, Ericsson and many more, where our students have been employed.

Several of our students have joined for higher study in different institutes of International repute, such as, IIT's in India and foreign universities.

Department of Mechanical Engineering

Since its inception in 1955, the Department of Mechanical Engineering has a wide reputation for the quality of teaching and research it offers. It has been awarded top grades for both teaching and research activities from independent and government bodies. The excellent laboratory facilities, modern computer clusters, systematically designed curriculum, and dedicated faculty members make this Department a dynamic place to study.

Programs Offered		Course Duration	Sanctioned Intake
B.Tech. in Mechanical Engineering		4 Years (8 Semester)	120
M.Tech. in Mechanical Engineering in following specializations	Heat Power	2 Years (4 Semesters)	12
	Design of Mechanical Equipment	2 Years (4 Semesters)	12
M.Tech. Computer Aided Analysis & Design		2 Years (4 Semesters)	18
M.Tech in Energy Technology		2 Years (4 Semesters)	18
Ph. D. Programmes: Ph.D. degrees are offered by the Department in Mechanical Engineering as well as in multi-disciplinary areas.			

Mechanical Engineering Graduates of BIT Mesra are sought after by many prestigious companies. There is also an excellent career center in campus, which helps the students to get entry into multinational companies.

All degree schemes offered are modular and structured to allow a gradual development of knowledge and skills. During the first two semesters of B.Tech. Program, students follow a syllabus of core engineering modules, which are common to all branches of engineering, plus some modules that are specific to the degree scheme. The courses also have a wide practical element based on the lecture modules, including laboratory work assignments, team projects and industrial tours and seminars.

In addition, every student carries out a professional project in their final year. The professional project gives students a chance to apply their engineering skills to real engineering problems. Many professional projects are industrially driven or linked, giving students direct exposure to industry as part of their studies. There is also a strong tutorial system, which provides students with a point of contact with a member of staff who can advise on welfare issues as well. Final year students are getting financial assistance of Rs. 50,000/- to convert their innovative ideas in the form of projects.

Last but not least, Department offers four major PG programs with specialized areas in focus. Students getting entry through GATE score and also through exam conducted for those with Non-Gate score. Ample of opportunities are extended like Internships and Jobs and good dedicated labs for their better enhancement. Students have also been extended with 1.0 Lakh rupees of grant through college for completion of their Projects in the Third and Final semester.

Vision of the Department:

The Mechanical Engineering Department of Birla Institute of Technology, Mesra, Ranchi strives to be globally recognized for quality engineering education and research leading to well qualified engineers, academicians and researchers who are innovative, entrepreneurial and successful in achieving excellence in their field of study.

Mission of the Department:

- *To impart quality education to the students and enhancing their knowledge and skills to be globally competitive Mechanical Engineers.*
- *To maintain state of the art research facilities to provide its students and faculty to create, interpret, apply and disseminate knowledge with an understanding of the limitations.*
- *To develop linkages and interaction with industry, R & D organisation and educational institution for excellence in consultancy practices, research and teaching.*
- *To provide conducive environment for learning, creativity and problem solving skill.*

The department has following well equipped laboratories:

Various specific labs with latest machines and techniques impart good expertise to the students for having hands on experience for real time problems. Some specific labs are :Heat Transfer Lab., Strength of Materials Lab., CAD Lab., Hydraulics and Hydraulic Machines Lab., Theory of Machines Lab., Renewable Energy Lab., Automotive/Adv. Fluid Mechanics Lab., I.C. Engine/Thermal Engg. Lab., Computational Lab., Refrigeration & Air-conditioning Lab. and Autonomous Systems Lab.

Certain new labs are in pipeline like Vibration lab and Reverse Engineering labs.Mnay interdisciplinary projects are being conducted and students look forward to new dimensions of engineering , Machine language and Artificial Intelligence.

Department of Pharmaceutical Science & Technology

The Department of Pharmaceutical Sciences & Technology was established in 1972. It offers the following programs:

S. No.	Programs Offered	Sanctioned Intake
1	B. Pharm. - 4-years (8-semesters) programme	60
2	M. Pharm. - 2-years (4-semesters) programme in five specializations a. Pharmaceutics b. Pharmaceutical Chemistry c. Pharmacology d. Pharmaceutical Quality Assurance e. Pharmacognosy	 15 15 15 15 15
3	M. Pharm. - 2-years (4-semester) programme under QIP	08
4	Ph.D. Program (including 8 under QIP)	Flexible

The above programs are recognized by the Pharmacy Council of India (PCI) and the All India Council for Technical Education (AICTE). **The B. Pharm. Programme is accredited by NBA for Five Years (2017-2022).** The Department is recipient of assistance under the Special Assistance Programme (SAP) of the UGC and FIST of the DST. The Department is also recognized and approved by AICTE as one of the Centres for Quality Improvement Programmes (QIP) for postgraduate and Ph.D. programmes.

The course syllabi are updated frequently to incorporate newer developments in Pharmaceutical Sciences & Technology and also to cater the need of Pharmaceutical Industries, Academic Research and Drug Regulatory agencies. Department has facilities for doctoral research in different areas of Pharmaceutical Sciences. A number of Ph.D. degrees have been awarded besides a large number of scholars, registered for Ph.D. in different disciplines of Pharmaceutical Sciences. The Department has highly qualified and competent academic staff.

The faculties of the Department have been handling several R&D projects sponsored by National (UGC, AICTE, CSIR, DST, ICAR, TRIFED, ICMR, etc.) and International (BMBF/New Indigo/UKIERI) funding agencies.

The Department has sophisticated state of the art laboratories besides a computational & molecular modeling laboratory for teaching and research. Some important facilities and instruments available are:

Field Emission Scanning Electron Microscopy (FESEM), ELISA Reader, GelDoc, Differential Scanning Calorimeter (Shimadzu DSC50 & DSC60), ELISA Reader (Perkin-Elmer), Automatic Video Tracking System (Ethovision), Fluorescence Spectrophotometer (Hitachi), Gas Chromatograph (Chemito Ceres 800 Plus), Gel Electrophoresis System, High Performance Liquid Chromatography (Waters and Knauer), Preparative HPLC (Agilent), High Performance Thin Layer Chromatography with WINCAT software (Camag), High Speed Refrigerated Centrifuge, FTIR 8400S (Shimadzu), Research Microscope with photomicrography (Carl-Zeiss) & High Resolution Research Microscope with Digital Camera with PC based screen (Leica), UV-VIS Spectrophotometers 1800 and 2450 (Shimadzu & Systronics), Rotational Viscometer (Wells Brookfield Cone/Plate), Nitrogen and Hydrogen Gas Generator (Claind), Milli Q Water Purification Unit (Millipore), Non – invasive B.P. Instruments (IITC Life Sciences), Plethysmograph (IITC Life Sciences), Microwave Synthesis System (Catalyst 4RI), Lyophillizer (Operon), Rotary Evaporator (Buchi), Probe sonicator, Dissolution Apparatus, Ultracentrifuge, Texture Analyzer, Malvern Viscometer, Nano spray dryer, Humidity chamber (as per ICH), Electromagnetic sieve shaker, Ball mill, Ultra turrax digital homogenizer, etc.

An overview of different areas of research at the Department is as follows:

Pharmaceutics group

New drug delivery system: Controlled release formulations, Transdermal drug delivery systems; Development of nasal delivery system; Colon targeted drug delivery system, self-emulsifying drug delivery system. Thermodynamic approach to drug excipient interactions, Cosmeceuticals (cost-effective skin care poly-herbal formulations), Nanotechnology based formulation development, Exploration of Natural Gum as Pharmaceutical Adjuvants and Standardization of Ayurvedic Drug/Polyherbal Formulations.

Pharmaceutical Chemistry group

In-silico design, synthesis (microwave, combinatorial solution phase synthetic techniques) and evaluation of novel candidate compounds with special reference to antimicrobial, antiprotozoal, antiviral, antiHIV, anticancer, analgesic, antihistaminic, anticonvulsant, cardiovascular, antidiabetic and other activities. Isolation and characterization of natural products using spectroscopic methods (UV-VIS/IR/NMR/MS etc.) besides studies on synthetic nutraceuticals, Molecular modeling, docking, QSAR and solution phase ADME studies using CADD based software like Maestro Glide, BioSolveIT FlexX, Sybyl 7.1, and Scigress Explorer.

Pharmacognosy group

Validation of traditional systems of medicine, validated methodologies for development of new herbal formulations, microcomputerized identification of indigenous drugs & development of standards, development of drug molecules from natural sources and their enhancement by biotechnological approaches, exploring natural resources for novel drug delivery systems.

Pharmacology group

Anti tumor & immunomodulatory studies of compounds from synthetic and natural sources, general pharmacological screening of new moieties from synthetic and natural sources, toxicological studies of bioactive molecules (natural and synthetic sources), neuropharmacological studies of bioactive molecules, studies of bioactive molecules on experimentally induced urolithiasis, nephropathy, neuropathy and diabetes in animal models, biochemical and molecular pharmacological studies of bioactive molecules.

The Department maintains a well-equipped animal house, which is accredited by the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). The Department also has a Medicinal Plant Garden spread over 10 acres of land within the Institute Campus. More than 200 plants of medical and aromatic importance have been cultivated and are being maintained in the Herbal Garden. A few aromatic oils such as Citronella (Java), *Cymbopogon martinii*, *Mentha arvensis*, *Mentha piperita*, *Eucalyptus citriodora*, Lemon Grass, are extracted from time to time.

The Department also extends support to other Departments like- Bio-Engineering, Chemical Engineering & Technology, Applied Chemistry, Environmental Science & Engineering, Medical Lab Technology at the University Polytechnic, Hotel Management & Catering Technology and other engineering departments.

Department of Physics

The Department of Physics since its inception in 1955 has played a pivotal role in the institute. The Department of Physics has a strong pool of highly qualified and motivated faculty members. They have, to their credit, numerous research publications and several R&D projects. Some faculty members have been awarded international fellowships from universities abroad and some have received different types of international fellowship awarded by DST, Government of India. The Department is well supported financially through "Fund for Improvement in Science & Technology Infrastructure" (FIST) programme of the Department of Science and Technology, New Delhi twice and under Special Assistance Programme (SAP) of the UGC. The Department has also received significant funds under TEQIP-I, II & III phases. The Department has been funded by agencies, viz. UGC, DST, BRNS, ARDB, ISRO, DRDO and CSIR for pursuing different research projects. Recently, the Department has completed several international (Indo-German, Indo-Russian, Indo-Israel) projects as well.

Programs Offered	Course Duration	Sanctioned Intake
Integrated M.Sc. in Physics	5 Years (10 Semesters)	30
M.Sc. in Physics	2 Years (4 Semesters)	15
Ph.D. Program	-	-

Salient Features of the Program

The main thrust of the Department of Physics is the 5 year Integrated M. Sc. Program which has been offering since 2011. The course aims to train the young students with the following objectives:

- To impart high quality Science education in a vibrant academic ambience.
- To prepare students to take up challenges as a researcher in diverse areas of theoretical and experimental physics.
- Excellent lab and internet facilities.
- Opportunity of pursuing high end research as project work.
- Exit option available after completion of three years with a B.Sc. Degree that enables students to take admission in the Integrated M.Sc. plus Ph.D. programs of different prestigious research organizations.
- During 9^{th} and 10^{th} semester, students may opt special papers for the following areas: Condensed Matter Physics, Electronics, Photonics and Plasma Sciences.

Achievements of alumni

- Availing exit option, some of the previous students have been admitted to the Integrated Ph.D. programs of Tata Institute of Fundamental Research, Bombay; Indian Institute of Science, Bangalore; Harish-Chandra Research Institute, Allahabad; etc.
- Some students have excelled in the GRE and TOEFL for higher studies in US universities.

Vision of the Department

To become an internationally recognized centre of excellence in academics, research and technological services in the area of Physical Sciences and related inter-disciplinary fields in the development of new knowledge.

Mission of the Department

- To train the students to be lifelong learners who will contribute to the creation of new knowledge, new technology, and innovation through excellence in research in emerging areas
- To educate students to be the future leaders in science, technology, industry, education and other professions and succeed in a globally competitive environment
- To create national and international collaborations for research engagement in strategic areas of research
- To impart high quality education in a vibrant academic ambience
- To provide beneficial service to local, state, national and international communities

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: To provide an intuitive physical understanding as well as rigorous mathematical analysis of involved concepts, which would help the students to grasp new concepts quicker.
PEO2: To solve complex problems with commensurate research methodologies as well as modern tools (mathematical, computational and experimental), keeping in view of socio- cultural and environmental factors.
PEO3: To be able to readily use techniques suitable to the problem at hand and be able to guess the asymptotic properties of solutions in case an exact solution is not possible.
PEO4: To communicate with Physics community and society at large adhering to relevant safety regulations as well as quality standards.
PEO5: To inculcate the ability for life-long learning to acquire professional and intellectual integrity, ethics of scholarship and to reflect on individual action for corrective measures to prepare for leading edge position in industry, academia and research institutes.
PEO6: To keep in mind the effects of undertaken projects on the society at large, and to avoid techniques that may flout social interests.
PEO7: To equip the students with state-of-the-art topics in research and development and working knowledge about a wide spectrum of research areas, so that they can take up interdisciplinary research.

PROGRAM OUTCOMES (POs)

PO1: An ability to independently carry out research /investigation and development work to solve practical problems.
PO2: An ability to write and present a substantial technical report/document.
PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program.
PO4: They will be prepared to take up challenges as globally competitive physicists/researchers in diverse areas of theoretical and experimental physics.
PO5: They will have a sense of academic and social ethics.
PO6: They will be capable of taking up higher studies of interdisciplinary nature.

More about the Department

The department has well equipped laboratories having several systems viz., RF magnetron sputtering, Plasma Enhanced Chemical Vapour Deposition (PECVD), thermal CVD, RF/DC magnetron co-sputtering, plasma nitriding, anodic vacuum arc deposition, plasma arc generator, Raman spectrometer, nanoindenter, solar simulator, D33 meter, PE loop-tracer, UV Visible Spectrometer, 10K cryostat etc.

At present the department has 17 faculty members and 14 research scholars. Besides two Indo-Russian projects, the department has been pursuing several sponsored projects funded by the UGC, DST, AICTE, BRNS, ISRO, ARDB, DRDO, NRB and CSIR. The current broad areas of research in the department include quantum optics, nonlinear optics, nanotechnology, condensed matter physics. Specific sub-areas are plasma processing of materials, surface engineering with plasma coating, surface modification using ion beam, anodic vacuum arc deposition of thin films, carbon nanotubes, diamond-like carbon (DLC) films, nano and ultra nanocrystalline diamond films, carbon nanotubes, solar cells, nanocrystalline superhard coatings, high temperature superconductivity, colossal magneto resistive materials, dilute magnetic semiconductors, piezoelectric materials, electronic composite materials, magnetic composites, soliton and light propagation, optical communication, photonic crystal fibres, optoelectronics, etc.

The department has organized various seminars and symposia, recent ones include:

- SERC School on Science and Technology of Plasmas, from 15th-27th December, 2008
- DST-INSPIRE Camp on Basic Sciences from 27th-31st January, 2010
- Recent Developments in Engineering Materials, from 12th - 14th May 2011
- CMDAYS – 2012, from 29th – 31st August 2012
- One Day Workshop on Solar Cell, on 15th May 2014
- National Conference on Nanoscience, Nanotechnology and Advanced Materials (NCNNAM-2016), September, 26-27, 2016
- National Workshop on Aero Satellite, March 14 - 15, 2019
- One Day Workshop on "Intellectual Property Rights" on 7th September, 2019

Department of Production Engineering

Since its inception in 1964, The Department of Production Engineering has been imparting quality education to undergraduate and post graduate students by training them to meet the demands of the manufacturing industry. The department has established links with the industry, R&D organizations, consultancy organizations and academic institutes in the nearby area in furtherance of the cause of manufacturing engineering. The department sees itself as the pathfinder of emerging technologies and techniques in production engineering, develops students to be technologically and managerially sound to meet the challenges of the rapidly changing manufacturing scenario.

Programs Offered	Course Duration	Sanctioned Intake
B.E. in Production Engineering	4 Years (8 Semesters)	60
M.Tech. in Automated Manufacturing System	2 Years (4 Semesters)	25
Ph.D. Program - Manufacturing and Industrial Engineering		

Vision of the Department:

- To become a center of repute striving continuously towards providing quality education, research and innovation in the field of production engineering.

Mission of the Department:

- To provide quality education at both undergraduate and postgraduate levels.
- To provide opportunities and facilities for research and innovation.
- To produce engineering graduates to meet the demands of manufacturing industries and R&D organizations.
- To emphasis on integrating manufacturing technology with management.
- To impart latest technological knowledge to students by continuous development of curricula and faculty.

The main objective of production engineering is integration of technology with management in planning and controlling the design, development and operation of manufacturing system. Rapid advances in manufacturing technology, e.g., computer-controlled processes and management information systems, ERP and new manufacturing concepts like TPS, agile manufacturing, pull system etc., are reinforcing the recognition of technological, organizational, economic and human factors. Furthermore, specialized training in manufacturing technology is necessary for industries in India and abroad.

Keeping the departmental vision in mind: To Become a Centre of Repute Striving Continuously Towards Providing Quality Education, Research and Innovation in the Field of Production Engineering, our department offers an M.Tech. course in Automated Manufacturing Systems.

Automated Manufacturing Systems is a post graduate course offered by Production Engineering department. Automated manufacturing system engineers are not only specialized in automation, but also in the integration and interoperability of technological systems. These systems are indispensable in the areas of computer assisted design and manufacturing operations and the production and inspection of end products. This program trains experts in automation, integration and optimization of technological systems designed for technology transfer in the industry. There are sub wings for this course namely, system design and automation, intelligent systems.

This is an interdisciplinary course seeking expertise in several branches of engineering viz. Manufacturing/Production, Mechanical, Electronics and Computer Science.

Department of Remote Sensing

Department of Remote Sensing was established in 1996 with an aim to meet the increasing demand for qualified manpower in this rapidly developing field. Application of Remote Sensing / Geoinformatics techniques using tools such as Geographic Information System (GIS) and Global Positioning System (GPS) in various activities including resources evaluation, environmental monitoring and land use/land cover mapping etc, has grown considerably during the last few decades and RS data products are increasingly being used for plan formulation at all levels. An essential pre-requisite to partaking in these opportunities is the building of various indigenous capacities for the development and utilization of space science and technology.

Programs Offered	Course Duration	Sanctioned Intake
M.Tech in Remote Sensing	2 Years (4 semesters)	18
M.Sc. in Geoinformatics	2 Years (4 semesters)	20
Ph.D. in all branches of Remote Sensing, GIS, Earth Sciences		

THE SIGNIFICANCE OF REMOTE SENSING

The world is being scanned constantly by highly sophisticated Earth Resources Satellites like IRS (India), LANDSAT (USA), SPOT (FRANCE), RADARSAT (Canada), IKONOS and Quickbird etc. to study and understand Earth's processes. Recent technological advancements like GPS,UAV, Web & Mobile GIS has accelerated the applications of Geospatial domain in various activities including resources evaluation, environment monitoring and landuse / landcover mapping etc. An essential pre-requisite to avail these opportunities is the building of various indigenous capacities especially qualified manpower.

Keeping this in view the department of Remote Sensing is striving to keep updated with technological development, and has expanded with the help of fund from DST-FIST, UGC-SAP, TEQIP. The department offers Post Graduate courses and Ph.D. program in inter-disciplinary mode. The Department has state-of-art laboratories equipped with latest software, hardware to provide hands-on training to its postgraduate students.
A multi-disciplinary team of faculty members is the strength of the department and they are also engaged in various R&D project & consultancy jobs from various government and international oraganizations. The department also participates in the Distance learning Programs (EDUSAT) conducted by IIRS, ISRO, Dehradun.

FACILITIES

The Department has seven dedicated labs catering to DIP, GIS, Digital Photogrammetry, Satellite Navigation & GPS, Remote Sensing Research & Project, and departmental library for Satellite Data and Maps.

ABOUT THE COURSES

M.Sc. Geoinformatics and M.Tech. Remote Sensing courses are 2 year degree program. These Degree Programs generally starts each year in the month of July, but the application and advertisement process will start from February onwards. All the courses are conducted in English language.

DETAILED ACTIVITES UNDER THE COURSE

In M.Tech. course, First year focuses on Theoretical and Practical Aspects of Remote Sensing, GIS, GPS, Photogrammetry, Programming, Geostatistics and various geo-spatial applications. Second year focuses mainly on developing Independent Research Skill.
In the first semester, the basic concepts, know-how procedures related to Geospatial Technology are taught to the students. The second semester delves deep into advanced concepts, modelling in GI domain along with modern photogrammetry using Satellite and UAV along with various Elective Modules. In due course the students are also provided with an opportunity to select OPEN ELECTIVE courses provided across the university. Students are also taught additional skills such as project management, research methods, data acquisition etc. The Third and Fourth semesters focus only on the RESEARCH THESIS. In the Research duration the student is supervised or co-supervised by the faculty.

Option for summer internship at various leading research centres in India is also provided time to time to encourage Academia-Industry Partnership. Students are also taken to field and other National Mapping organisations to expose them with actual process and activities in GI domain.

For MSC, the period of theoretical study is spread over 3 semesters with examination requirements at the end of each semester. Fourth Semester will be allocated only for Research Project. Also in the 3rd semester there will be a mini Project which helps the student to orient towards research over a period of 1 year (i.e., 3rd and 4th semester project together) when they complete their degree course. The Masters program requires 80 credit points. The detailed credit information is provided in the Course Structure.

The Masters program (both M.Tech. and M.Sc.) will help the student to take their future career path in the direction of Natural Resources planning/management, regional planning, GIS Analyst in private growing market and various application domain. At present the qualified Geoinformatics personnel is lacking in most of the Government departments and hence our degree will provide an excellent career enhancement opportunity. Graduates from geography, agriculture, forestry, geology, physics, maths and Engineers in Civil, ECE, EEE and Computer Science can apply for our programs. For M.Sc. programme one need to have a simple Bachelors degree but for M.Tech. program the candidate need to have either Masters degree or 4 years Bachelors degree.

PLACEMENT

M.Tech. Remote Sensing and MSc Geoinformatics degrees from BIT are highly recognised, reputed and well accepted in India and Abroad. Our students are placed at Various Leading Institutions in India such as ISRO, IITs, ICAR, NITs, NGOs and Various Government Departments. Our students have good scope of getting admission in International Universities and many of our alumni are currently carrying out higher education in Beijing, Delft-Netherlands, New York etc. Our students also work as Scientist, GIS Analyst/expert, JRF, SRF, consultant, Lecturer and other positions requiring geoinformatics skills. State Remote Sensing centres, IMD (Indian Meteorological Department), SAC, NRSC, and many governmental organizations, and diverse private sectors are the places our students gets often placed.

FELLOWSHIP/SCHOLARSHIP OPPORTUNITIES

There are numerous scholarships provided by Indian Government for pursuing Ph.d. degree after these courses such as Rajiv Gandhi Fellowship for SC/ST candidates, Maulana Azad fellowship for Minority Communities, Prime Minister Fellowship, National Fellowship for OBC Candidate, Post-Graduate Indira Gandhi Scholarship for Single Girl Child, Post-Graduate Merit Scholarship for University Rank Holder, "Ishan Uday" for North Eastern Region, UGC-JRF, CSIR-JRF etc.

Department of Space Engineering and Rocketry

The Department of Space Engineering and Rocketry – the first of its kind in the country was established in 1964 to train scientists and engineers in the important areas of Aerospace Engineering and Rocket Technologies. Since 1968 it has been offering a post- graduate degree course in Space Engineering and Rocketry with in-depth specialization in two specific areas: Aerodynamics and Rocket Propulsion. The Department aims to provide state of art education and training to its students to enable them to contribute efficiently in the National efforts being made in the fields of Space & Defence related technologies and challenging future missions.

Programs Offered	Course Duration	Sanctioned Intake
M.Tech. in Space Engineering & Rocketry in two specializations a) Aerodynamics b) Rocket Propulsion	2 Years (4 Semesters)	 12 12
Ph.D. Program	-	-

The Department also provides research facilities at doctoral and postdoctoral levels in the fields of Aerodynamics and Flow Studies, Propellant Technology, Rocket Propulsion and Combustion.

The Rocket Propulsion Laboratory has static test set-ups equipped with a computer controlled firing facility and data acquisition and analysis system for solid, liquid and hybrid rocket motors. Basic infrastructure for design and fabrication of rocket motors is also available in the Department. The Department has developed and flight tested its own rockets of different calibers.

In the area of Propellant Technology, complete processing and characterization facilities are available for rocket propellants and igniters. Advanced techniques and equipments for carrying out research in the areas of high-energy materials, igniters, inhibitors and insulators, and high performance metalized gelled propellants are also available in the Department. High pressure and sub-atmospheric pressure combustion facility also exists for solid propellants.

Modern equipments like simultaneous thermal analyser, thermo-gravimetric analyser, differential scanning calorimeter, viscometers, rheometers, calorimeters, spectrophotometers, Double Planetary Mixure, Micronizer, flame propagation and stability unit etc. are also available for training and research.

In the Aerodynamics Laboratory, 4 wind tunnels, free jet, water tunnel are available to train students and carry out research work in the fields High speed/ Low speed Aerodynamics, and unsteady Aerodynamics. Different types of pressure sensors and flow visualization techniques are available to study the flow field on scaled models of aerospace vehicles. Commercial software ANSYS to carry out CFD related activities is available with high end research licenses. Apart from this, open source CFD Software open FOAM is extensively used for research activities. In-house CFD code developmental activities are also undertaken.