

## DEPARTMENT OF BIOTECHNOLOGY

Biotechnology is an emerging science which uses living systems and organisms to develop and make useful products by applying principles of engineering. In last few decades Biotechnology has created an impact on the society, human welfare as well as industrial manufacturing processes. Today biotechnology is oriented to meet the challenges in healing (medicine and healthcare), feeding (food and agriculture) and fueling (alternative energy sources) the world.

### **Thrust areas of research :**

Department of currently engaged in different research activities which includes isolation of genes from metal contaminated sites using metatranscriptomic approach, use of microbes in remediation of building materials to enhance the durability, isolation of bacteria capable of degrading cellulose, biofuels from algae, regulation of genes involved in cold induced sweetening of potatoes, bioactive molecules from endophytic fungi, production of biopolymeric substances from bacteria, food safety, isolation of immunomodulators from plants and microbes, population genetics, epigenetics and DNA methylation.

- Plant Microbe interaction
- Industrial Biotechnology
- Agricultural Biotechnology
- Food Biotechnology
- Immunology
- Cancer genetics
- Environmental microbiology
- Bioremediation

## DEPARTMENT OF CHEMICAL ENGINEERING

The Department of Chemical Engineering has an excellent ensemble of dynamic, goal oriented, highly qualified and experienced faculty members from diverse streams and specializations. The curricula at both the undergraduate and graduate levels are designed to support and foster Chemical Engineering as a profession, which interfaces Engineering with all aspects of Basic sciences. Keeping in view of the current and future requirements of the academia and industry, the department offers a wide spectrum of courses supplemented by a number of electives in the emerging areas at both undergraduate and postgraduate level. In order to ensure a broad-based education, both the theory and practical aspects of Chemical Engineering discipline are emphasized.

**Thrust areas of research :**

- Paper and pulp
- Polymers
- Polymer nanocomposites
- Adsorption
- Divided wall distillation
- Reactive distillation
- FCC raiser reactor modeling and simulation
- Computational fluid dynamics
- Molecular modeling
- Nanofluids
- Heat Pipes
- Membrane separation

**DEPARTMENT OF CIVIL ENGINEERING**

The Department of Civil Engineering with its modern infrastructure and state of the art facilities for research offers programs leading to a Bachelors' Degree in Civil Engineering, a Masters of Engineering in Civil - Structures, & Infrastructure and Doctor of Philosophy in Civil Engineering. With a number of scholars registered for their doctoral thesis in the department, it has already created a niche for itself in this part of the country and is striving to be among the top ten civil engineering departments of the country.

**Thrust areas of Research :**

- Structural Health Monitoring
- Sustainability in Concrete & concrete technology
- Ground water hydrology and dispersion studies.

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

Department of Computer Science & Engineering embodies the University's tradition of excellence as a world-class leader in computer science & engineering education and research. The goal of department of computer science is to be outstanding in every aspect of its function, namely graduate and post graduate programmes, sustain excellence in teaching and research and provide broad educational and research experiences through multifarious programmes. Department of Computer Science & Engineering has its own special role to play by virtue of its charter of aims by its unique methods and by its very characteristics existence.

**Thrust areas of research**

- Parallel and Distributed Computing

- Grid and Cloud Computing
- Algorithms
- Wireless Networks
- Soft Computing
- Theoretical Computer Science
- Network and Information Security
- Machine learning
- Animation and gaming
- Software Engineering

### **DEPARTMENT OF ELECTRICAL & INSTRUMENTATION ENGINEERING**

Department of Electrical & Instrumentation Engineering offers undergraduate and postgraduate programmes in both Electrical and Instrumentation Engineering. The department is a centre of excellence for developing high quality, professionally groomed, technical and engineering manpower in the areas of Electrical Engineering and Electronics Instrumentation & Control Engineering. The department has the legacy to book writers of international repute.

#### **Thrust Areas of research :**

- Power system
- Soft computing techniques
- Bio-metrics
- Bio-medical Instrumentation Engineering
- FACTS devices and Custom Power
- Power Electronics & Dives
- Process Control & Instrumentation
- Environmental Instrumentation

### **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

The Department of Electronics and Communication Engineering was established in 1975 to cater to undergraduate education in the field of Electronics and Communication Engineering. It aims to produce quality professionals in Electronics and Communication Engineering to compete globally and excel by carrying out basic and applied research in emerging areas by forging strong industry-institute interaction.

#### **Thrust Areas of research :**

- Microstrip antennas for next generation wireless communication systems
- Multi-banding of antenna
- Broad banding of antenna

### **Nano Devices**

- Nanophotonic Devices
- Optical MEMS / NEMS
- Hybrid Nano Devices
- Carbon Nano Tube based VLSI Interconnects
- Modeling and design of CNT based interconnects for next generation VLSI design.
- CNT based FET

### **Optical fibre communication**

- DWDM system, optical networks, optical amplifiers, optical sensors, optical computing, integrated optics

### **Signal Processing**

- Fractional Signal Processing
- Image Processing
- Change detection

### **VLSI System and Circuit design synthesis**

- VLSI Signal processing
- Digital VLSI Design

### **Wireless Communications**

- MIMO Communication Systems
- Fractional Fourier Transform based Communication System
- Coding for wireless Systems
- MIMO OFDM

## **DEPARTMENT OF MECHANICAL ENGINEERING**

The Department of Mechanical Engineering was established in 1956 with an aim to produce quality professional in Mechanical Engineering to compete globally and excel by carrying out basic and applied research in emerging areas by forging strong industry-institute interaction. After the institute became a deemed university in 1985 the department has increasingly focused on post-graduate education and research.

### **Thrust areas of research :**

- CAD
- Mechanical Design
- CAM
- CAPP
- Computational Mechanics
- Composite Materials
- Non Traditional Machining
- Technology Management
- Ergonomics
- Heat transfer & Energy Conservation

## **SCHOOL OF BEHAVIORAL SCIENCES AND BUSINESS STUDIES**

The School of Behavioral Sciences and Business Studies offers various core and elective courses in the area of business studies as well as behavioral sciences to undergraduate and postgraduate students. These courses are aimed at developing students to become effective business managers in their careers besides inculcating in them an understanding values, culture and heritage. The school offers Ph.D. programme in social sciences and humanities.

### **Thrust areas of research :**

- Industrial Management
- Cognitive and Experimental Psychology
- IPRs in Manufacturing
- Knowledge Management
- Human Resource Management
- Guidance and Counseling
- Clinical Psychology

## **SCHOOL OF CHEMISTRY & BIOCHEMISTRY**

School of Chemistry & Biochemistry is a unique school of learning and fostering innovative scientific ideas through interdisciplinary teaching and research in frontal areas of the natural sciences. Faculty is actively involved in frontier areas of research and having sponsored projects.

## **SCHOOL OF ENERGY & ENVIRONMENT**

School of Energy and Environment is a new school carved out from the Department of Biotechnology and Environmental Sciences and has been expanded to include (in addition to the environmental sciences, technology and management) energy science, technology management and safety. R&D activities of the school currently include river water quality monitoring and management, metal bio-transformations, advanced oxidation processes, industrial environmental management, ambient air quality and bio-remediation and bio-plastics. The school has collaborated with the sophisticated Analytical Instrumentation Laboratory which is actively involved in testing, training, sponsored research and consultancy activities in the areas of energy, environment, chemicals and materials.

### **Thrust areas of research :**

- Industrial environmental management
- Air pollution modeling and assessment
- Advanced oxidation processes
- Metal biotransformations and bioremediation

- Waste water treatment and management
- Water Quality Monitoring
- Water and waste water treatment technologies
- Rural and urban storm water management
- Microbial technology and solid waste management
- Alternative fuels, bio fuels, dual fuel engines
- Water shed management

## **SCHOOL OF MATHEMATICS AND COMPUTER APPLICATIONS**

The school offers professional degree programs in mathematics and computer applications designed to develop full professional potential of students. The school work forward to produce proficient graduates for employment in technologically challenging areas in industry, academia and business. Apart from providing foundational support in mathematics for various academic programmes across the University, we offer various reputed courses including Ph.D. in mathematics and computer related areas.

### **Thrust areas of research :**

#### **Computer Applications**

- Soft computing and statistical computing / NLP,
- Software engineering
- Pattern recognition
- Fracture mechanics
- Component based software development
- Algorithm analysis and design
- Networks
- Digital image processing
- Computer graphics
- Evolutionary algorithms
- Network security
- Grid computing / parallel computing / cloud computing

#### **Mathematics**

- Functional analysis
- Theoretical astrophysics / reliability / numerical analysis
- Optimization techniques
- Algebra
- Differential equations
- Fuzzy reliability analysis
- Fuzzy optimization

- Partition theory
- Number theory mechanics
- Mathematical programming

### **SCHOOL OF PHYSICS & MATERIAL SCIENCE**

School of Physics & Material Science is well known for excellent teaching and research activities. The school offers core courses of Physics & Materials Science to all undergraduate students. The faculty is highly qualified and is doing very well in their area of research. All faculty members have R&D projects funded by different funding agencies like DRDO, CSIR, UGC and DST.

#### **Thrust areas of research :**

- Liquid crystals
- Micro/nanotechnology
- Solid oxide fuel cells
- Electroceramics
- Nuclear Physics
- High energy physics
- Magnetic Materials

### **L.M. THAPAR SCHOOL OF MANAGEMENT (OFF CAMPUS)**

L M Thapar School of Management (LMTSOM) reflects the epitome of new thought taking place in the realm of management education. The school combines innovative pedagogy with technology as a backbone to create a strategy and vision for success in the area of business and management education.

The MBA Programme at LMTSM revolves around the principles of ethical decision making, inclusive human resources management, sustainable strategy and entrepreneurial development. The teaching philosophy underlying above principles is that future business managers and leaders will be working in a global environment and thus need to be nurtured with personalised attention. The MBA program thus focuses on developing an entrepreneurial mindset, analytical thinking, global orientation and consultative approach to solving the most challenging and complex problems faced by corporations and policy makers. The program is aimed at developing ethically responsible professionals; leaders who can communicate effectively to frame problems and provide solutions through social and commercial entrepreneurial activities. A mix of diverse teaching methods such as case studies, focused workshops, lectures and discussions, simulation games, and collaborative learning is adopted to provide a holistic learning experience.

## **SOPHISTICATED ANALYTICAL INSTRUMENTS LABORATORIES (SAI LABS)**

The SAI Labs was established in April 2011 with the main objective of having a central facility in the Thapar University campus to carry out high end testing, consultancy & research. In addition to research programs, it offers state of the art testing and characterization facility to cater to the high end testing needs of the industry, society as well as educational institutes. It is recognized as Environmental Laboratory by Ministry of Environment and Forest (MoE&F) and Punjab Pollution Control Board (PPCB).

## **CENTRE FOR INDUSTRIAL LIAISON AND PLACEMENT (CILP)**

### **Activities of CILP:**

- Campus Recruitment Programme
- Project Semester Placement of students
- Summer Training Programme
- Industry Institute Interaction
- Continuing Education Programme

CILP arranges campus interviews for placement of final year students of all branches by inviting various Public Sector and Private organization. A data base of organizations is available with CILP which is continuously updated.

All students of various BE engineering disciplines are required to spend a full six month's semester in the industry completing an industrial project under the joint supervision of industry supervisors and TU faculty. Similarly the students of MCA do a System Development Project (SDP) of sixteen weeks duration, the students of M.Sc spend a six weeks summer training & students of MBA spend two months training in the industry. This provides a system of education that formally integrates academic studies with related work experience. More than 150 Industries provided Project slots/Training to our students, CILP assists in arranging project semester slots for various branches of engineering.

CILP also assists in arranging six week's summer training for students of BE IYr of Electronics and Communication Engineering, Electronics (Instrumentation & Control), Electrical and Computer Engineering disciplines.

CILP is closely involved in Industry/Institute Interaction Programmes such as Faculty Exchange Programme, Mobility of Industrial Personnel Programme and Joint Research Projects in collaboration with industries.

## **CENTRE OF RELEVANCE AND EXCELLENCE (CORE) IN AGRO AND INDUSTRIAL BIOTECHNOLOGY**

The Centre of Relevance and Excellence (CORE) in Agro and Industrial Biotechnology was established as a national level center during the first phase of the MISSION REACH 2020 program envisioned by former President and distinguished scientist Dr.



A.P.J. Abdul Kalam. The program was implemented by TIFAC (Technology, Information, Forecasting and Assessment Council), Department of Science and Technology (DST), Govt. of India and CORE was created at Thapar University in the year 2000 based on the research expertise and training impetus.

CORE in Agro and Industrial Biotechnology is a meeting place of innovation, industrial development and intellectual human resource development. It emphasized on the tripartite linkage between academia, industry and the Government. CORE in Agro and Industrial Biotechnology synergizes the skills and research expertise across the Thapar University from different departments and schools, predominantly from Department of Biotechnology.

### **SCIENCE AND TECHNOLOGY ENTREPRENEUR'S PARK (STEP)**

STEP at Thapar University promoted by NSTEDB, Department of Science & Technology, GOI is a centre for business incubation to promote business in the upcoming multidisciplinary area of Biotechnology. Established as a joint venture between national Science and Technology Entrepreneurship Development Board, Department of Science & Technology, Government of India and Thapar University in April, 2005, it offers a platform to individuals with semi-developed novel idea into proof of concept from bench scale to pilot plant by providing infrastructure support and forging link with relevant organizations and industries. STEP has taken the lead in nurturing innovations and converting them into commercial ventures. STEP activities are intended to stimulate technological innovation, utilization of research results, transfer of knowledge and setting up of technology driven business so that fruits of knowledge reaches the society in the shortest possible time. STEP focuses on the domains of agri-biotechnology, biofertilizers, mushroom cultivation, plant tissue culture and food processing technology. STEP has successfully incubated 18 companies out of which 9 have graduated. These firms have created more than 40 jobs and are generating revenues of nearly 1 crore. STEP has created an ecosystem for entrepreneurial education and is optimizing model for attracting clients and funds for its sustenance among its stakeholders.

### **CENTRE OF INFORMATION AND TECHNOLOGY MANAGEMENT (CITM)**

Centre of Information and Technology Management (CITM) was established in the year 2011 by integrating Computer Centre, Centre for Information Super Highway and University Science Instrumentation Centre. It caters to the needs of users involving implementation, maintenance and support activities related to software and hardware, procurement, support and maintenance of various equipment, and also providing the internet support to the campus community. This centre also looks after the implementation of ERP software and related support to the users of Thapar University besides maintaining and administrating the University website.

## **NAVA NALANDA CENTRAL LIBRARY**

University library is housed in a centrally air conditioned spacious premises covering an area of 25000 square feet. It has over 80,000 volumes of books, reference books, course materials, text books etc. The library also has 2325 print theses, 4317 bound volumes and 3200 standards. These are available on D-space server and can be accessed from anywhere on the globe. From 2006 onwards all the PhD and Master theses are uploaded on D-Space. Library subscribed to about 11386 e-journals, 1351 e-books and 117 print journals. E-journals are received under UGC- Infonet program, INDEST consortium and directly from supplier / publishers. Library remains open 24x7 throughout the year. Most of the library operations are automated. Library catalogue (OPAC) can be searched from anywhere and subscribed e-resources can be searched from anywhere in the campus.