CENTRE FOR BIOMEDICAL ENGINEERING
(M. Tech)
Training and Placement Brochure
2021-22
Centre for Biomedical Engineering was established in 1971 as a Joint programme of Indian Institute of Technology, Delhi and All India Institute of Medical Sciences, Delhi. The centre has applied engineering principles to address medical and biological problems. It has faculty from diverse backgrounds who are actively engaged in various interdisciplinary research activities. In the last two decades the focus has expanded to include biological medicine, development of innovative biomaterials, implants, biomedical devices and informatics approaches for the prevention, diagnosis, treatment, rehabilitation and injury mechanics.
FACILITIES @ CBME

Biomechanics Lab
- Wireless EEG System
- EMG System (Trigno)
- Flexural testing

Biosensor & POCT
- BSL 2 facility
- 8” Mask aligner
- Thermal evaporator

Biomaterials Characterization
- Laser Confocal Microscopy
- Raman microscopy
- Particle Analyser
- RT-PCR
- Flow cytometer - BD Accuri
- GPC-Viscotek
Development of Methods and Software tools for processing and analysis of Medical Imaging and Signal Data; Quantitative Imaging; Applications of Machine Learning; Patient specific 3D modelling
FACILITIES @ CBME
Medical Device Fabrication facility

3D-Printer - Stratasys Objet30 OrthoDesk

400 W CW Fibre laser

Injection Molding BOY XXS

Dual Laser (CO2 + fibre laser)

Device Testing Laboratory

High resolution spectrometer HR2000 ES
M. Tech programme in Biomedical Engineering is designed for students from both engineering and science disciplines to give training in frontier areas for solving the longstanding problems of healthcare.

During 1st Year students are provided with basic knowledge across biology, chemistry, mathematics, clinical science and engineering.

During 2nd year students will undertake research project in their area of interest.

Some of the core courses and electives taught by the centre to students are as follows:

<table>
<thead>
<tr>
<th>Basic electronics</th>
<th>Tissue Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Maths. for Biologists</td>
<td>Nanomedicine</td>
</tr>
<tr>
<td>Basic Biology and Physiology</td>
<td>Biomaterials</td>
</tr>
<tr>
<td>Mechanics of Biomaterials</td>
<td>Biomedical Signal and Image Processing</td>
</tr>
<tr>
<td>Fundamentals of Biomechanics</td>
<td>Cancer: Diagnosis and Therapy</td>
</tr>
<tr>
<td>Industrial Biomaterial Technology</td>
<td>Biosensor Technology</td>
</tr>
<tr>
<td>Medical Imaging</td>
<td>Point of Care Medical Diagnostic Devices</td>
</tr>
<tr>
<td>Biomedical Instrumentation</td>
<td>Biofabrication</td>
</tr>
</tbody>
</table>
Biomedical Imaging

Core areas

Biomechanics

Biomaterials

Bioinstrumentation

Technologies and devices for biomedical applications
- Diagnostics
- Therapeutics
- Implants
- Rehabilitation
TECHNOLOGIES DEVELOPED

✓ Polymeric nanoparticles and process of preparation thereof for delivery of chemotherapeutics, peptide and DNA based anticancer agents.
✓ Hemoglobinometer.
✓ Intelligent prosthetic leg for amputees.
✓ Antimicrobial acrylic bone cement for fixation of hip and knee joints.
✓ Polymeric nanoparticles based toners for digital imaging and related applications.
✓ Heat sealable coatings onto paper for packing applications.
✓ Iontophoresis Unit for transdermal drug.
✓ Surgical drill guides for scoliosis.
✓ Forcemyography.
✓ Physiological Signal Guided Brain Stimulation with Adaptive Performance Feedback.
✓ Device for Exerting Axial Load on Load Bearing Joint of Human Being During Scanning.
MEDICAL PRODUCTS

Hemoglobinometer

Intelligent prosthetic leg

Caliper forossicle surgery

Variable stiffness elbow implant

Soft skin regeneration

Instrumented Shoe

Insole based foot pressure measurement system

Affordable hearing screening device

Alveolar distractor

Portable typhoid diagnostic device
ON-GOING RESEARCH PROJECTS

✓ Fabrication and evaluation of Bio-Nano Composite Scaffold for Chronic wounds.
✓ Quantitative software tools to detect intracranial mass lesions.
✓ Methodology for Quantitative CEST-MRI.
✓ Design of cell-free vaccine for cancer immunotherapy.
✓ Development of elbow prosthesis.
✓ Electroencephalogram signal analysis during locomotion in different terrains and the transitions: A neurophysiological study.
✓ Development of functionalized polymeric materials for rapid detection of food borne pathogens.
✓ Development of biodegradable copolymers from renewable resources: evaluation of properties and applications.
✓ Applications of non-silicon based nanofabrication technologies and nanoscale devices.
✓ Development of new functional nanomaterials.
ON-GOING M.TECH. THESIS PROJECTS

- Integrating control system and mathematical equation for modeling of pancreatic cancer.
- Development of artificial cerebral arteries for neurosurgical training.
- Wearable voice health monitoring device.
- Development of methods for medical image analysis and evaluating their clinical applications.
- A wearable glove for dynamic grasp force and hand pose estimation for neurohabilitation applications.
- Treatment of cancer by delivering drug using Graphene Oxide.
- Image registration using deep learning.
- Organo-mimetic Microfluidic Culture Platform.
C O L L A B O R A T I O N S

1. GOVERNMENT ORGANISATIONS
   DRDO - Defense Research and Development Organization
   CSIR - Central Scientific Instruments Organization
   National Physical Laboratory (NPL)
   National Institute of Immunology (NII)
   National Institute of Health and Family Welfare

2. ACADEMIC
   Jawaharlal Nehru University
   Massachusetts Institute of Technology
   The University of Texas at Austin
   John Hopkins University, USA
   University of Ulster, Ireland

3. PRIVATE ORGANIZATIONS
   Boston Scientific Private Limited
   Stryker India Private Limited
   Fortis Hospitals
   Indian Spinal Injury Center
   Mahajan Imaging Centre
1. GOVERNMENT ORGANISATIONS

Indian Council of Medical Research
BIRAC, Department of Biotechnology
Indo-German Science & Technology Center
Department of Science Technology
Department of Biotechnology
PAST RECRUITERS

1. Kinapse
2. Child Health Imprints
3. Philips Healthcare
4. Stellarix
5. Jajal Medical
6. Biocon
7. Mphrx
8. Indian Spinal Injuries Centre
9. TCS Finance

Please visit website of the Office of Career Services (https://ocs.iitd.ac.in) for information regarding recruitment process and more.
Faculty Placement Coordinator & M.Tech. Programme Coordinator: Prof. JAYANTA BHATTACHARYYA
Email: jayanta@cbme.iitd.ac.in
Phone: +91-11-2659-1337

Student Placement Coordinator: Mr. PREM NATH YADAV
Email: bmt202729@cbme.iitd.ac.in
Phone: +91-8823032410