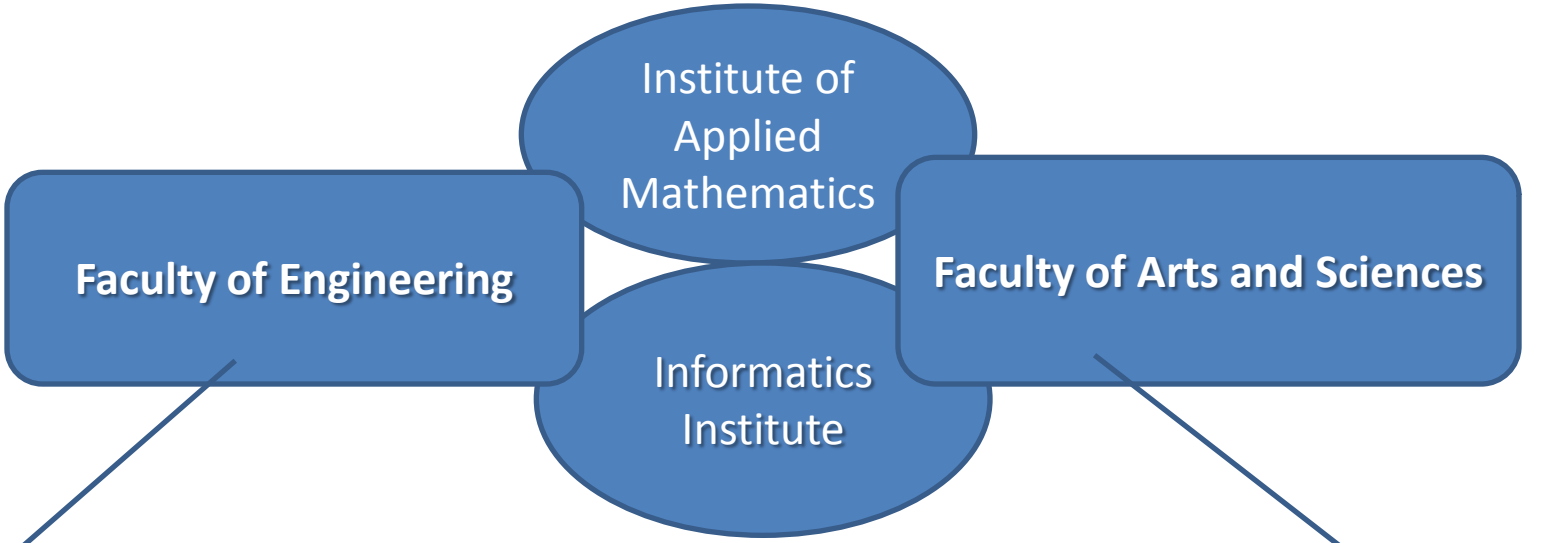
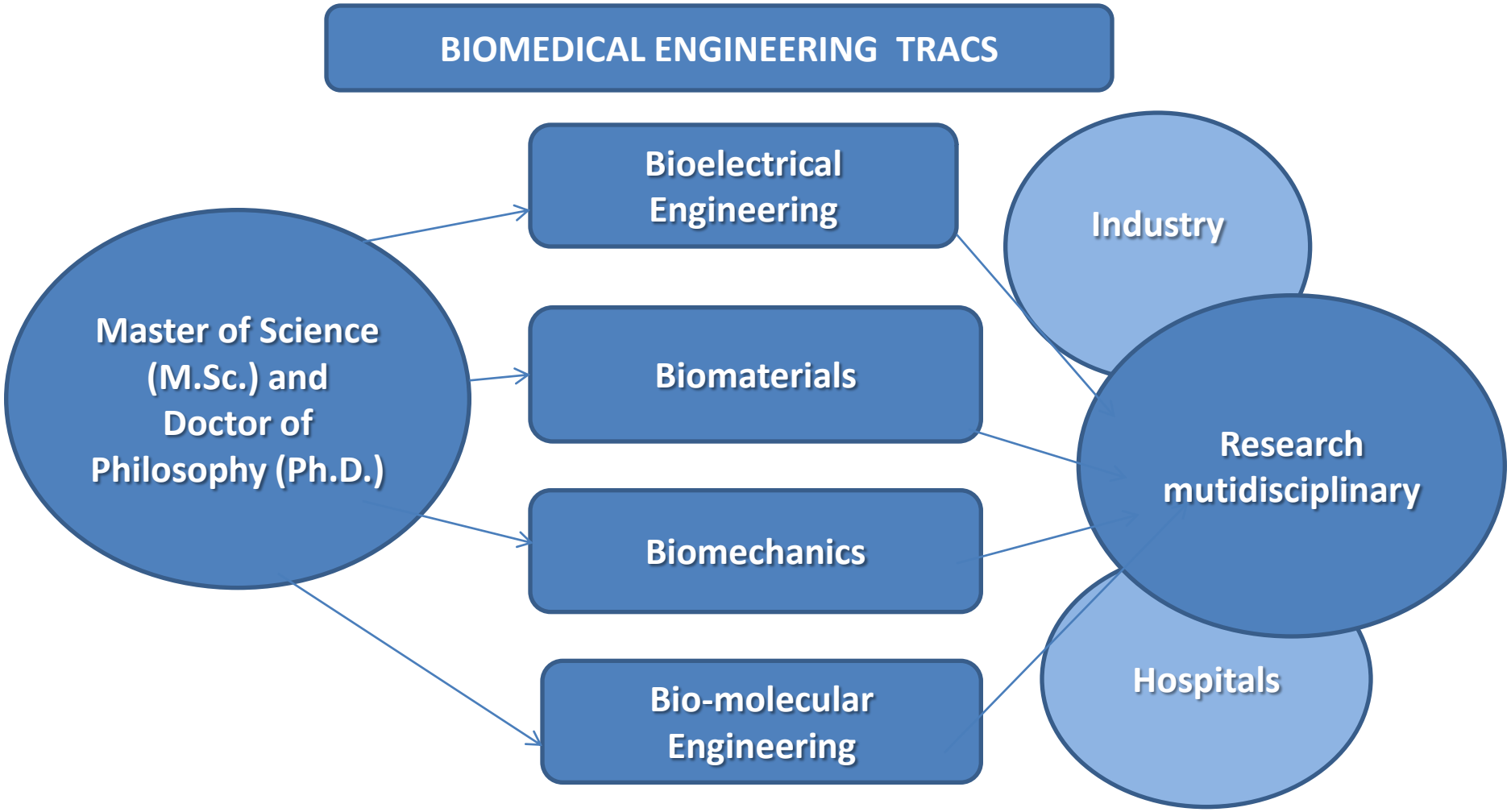
Biomedical Engineering Graduate Program in METU / ANKARA



- Electrical and Electronics and Engineering
- Mechanical Engineering
- Engineering Sciences
- Metallurigical and Materials Engineering

- Biological Sciences
- Chemistry
- Statistics
- Physical Education and Sports

➢ The program aims to provide an understanding of the problems in biological sciences and in medicine, and a foundation for solving these problems by applying methods and concepts from engineering, physics, chemistry and biology



MAJOR RESEARCH FIELDS

Production of bioactive molecules and recombinant therapeutic proteins

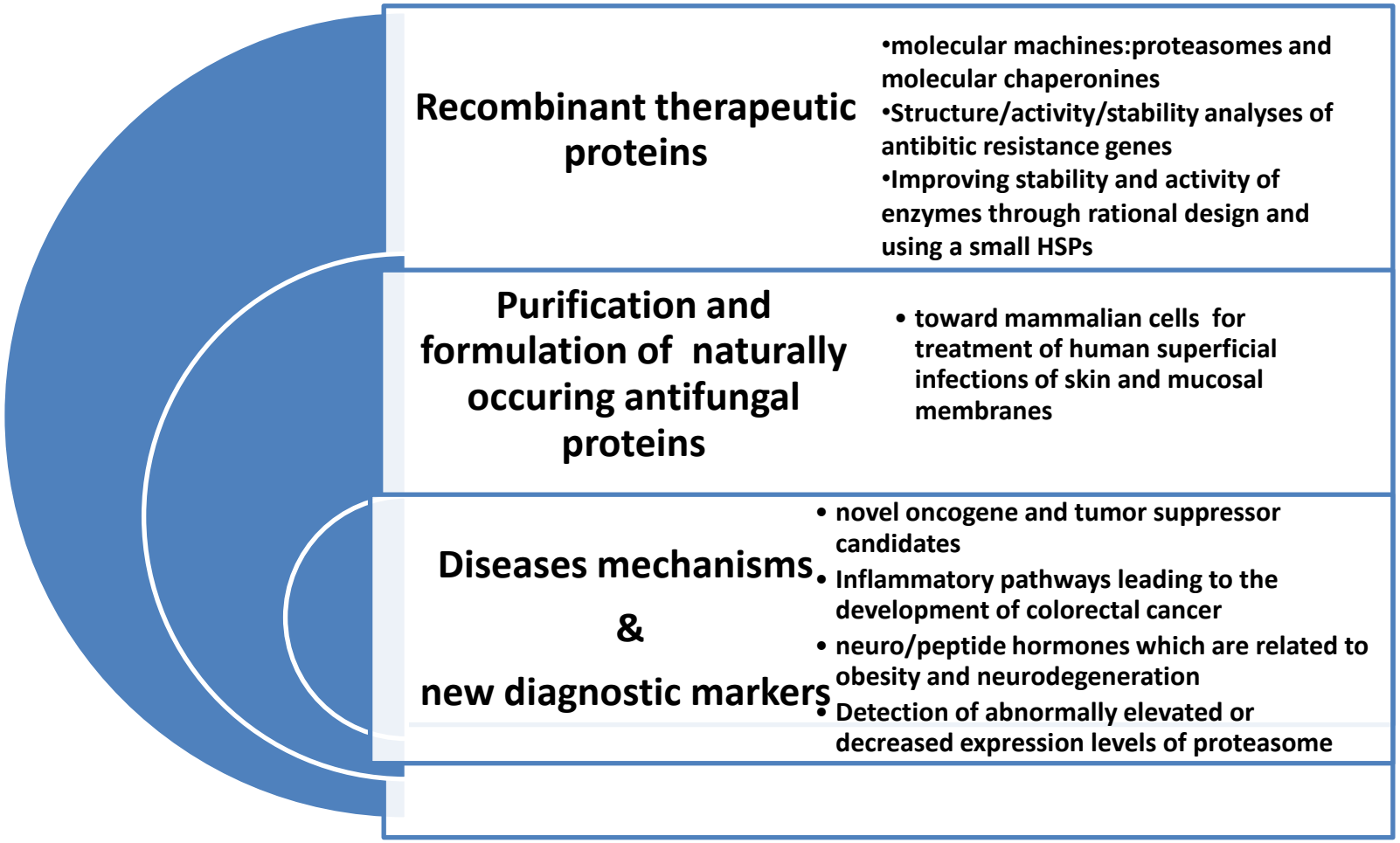
Understanding molecular mechanisms of diseases and new diagnostic markers

Medical Imaging and Image Processing

Mathematical modelling, Computational Biomechanics

Tissue implants, engineering and regenerative controlled release systems, immobilizations for biosensors and bioreactors.

Research Teams: Biomolecular Engineering Team Research



Research Teams: Biomolecular Engineering Team Labs

Protein Structure and Function

- Modernly equipped with state-of-art research equipments laboratory for molecular biology and recombinant DNA research, protein expression/purification/functional and structural characterizaton/ (UV/Visible and flourescent spectroscopy, electrophoresis systems, image anlayzers, qPCR Light Cycler, , highspeed centrifuges etc)

Pharmaceutical Biotechnology

- Well equipped for up- and downstream processes, facilities for protein synthesis, purification, and yeast genetics studies

Cancer Research

- Department of Biological Sciences's Core facilities:(limited) lab. animal facilities , cell culture facilities, microscopy, spectorscopy, ultracentrifuge e*tc*,
- Research laboratories well-equipped for cancer biology studies

Research Teams: Bioelectrical Engineering Team Labs

Medical Instrumentation

- e.g., EEG, ECG, EMG, phonocardiogram, rheograph, recorders
- image acquision and output devices particularly for realtime subtraction imaging techniques
- Up-to-date, fast computers, parallel processing cluster for Brain Research

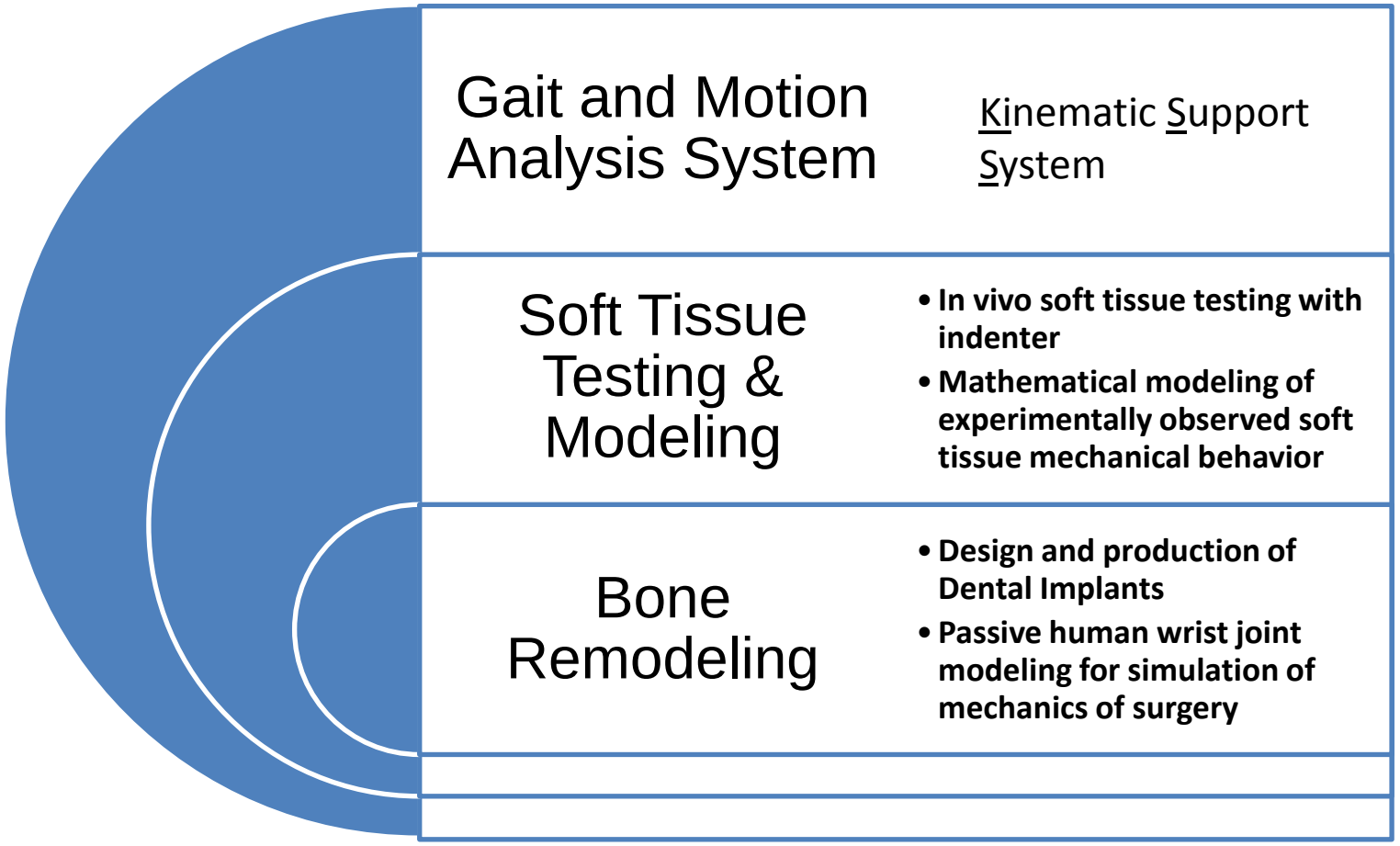
Magnetic Resonance Imaging

- 0.15 Tesla Oxford body magnet,
- Spectrometer electronics,
- PC based front-end,
- Computing and simulation facility,
- RF coil design

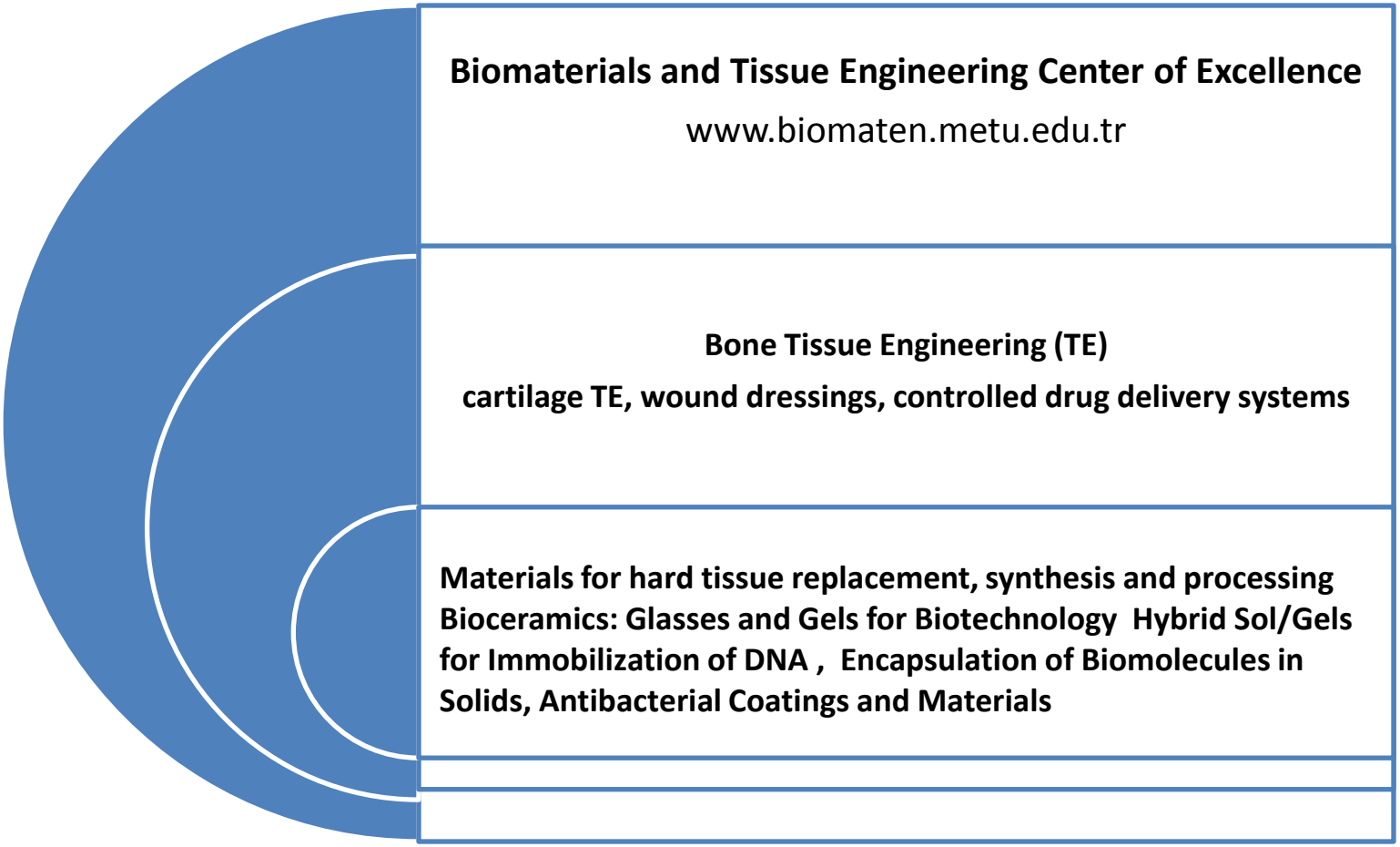
Microelectronics MEMS and Optoelectronics
BioMEMS Research Group

- a microelectronics fabrication facility for 4", 6" and partially 8" wafer processing with a 1000 sq. meters of class 100 and class 1000 clean room area for fabrication and 300 sq. meters of class 10000 clean room area for electrical testing of IC's and active discrete components
- equipment include a stepper with a 0.35µm resolution, automatic photo resist coaters, DRIE, RIE, ICP RIE, PECVD, LPCVD, a contact aligner with wafer bonders, oxidation and diffusion furnaces, a vacuum probe station for wafer level probe testing, and a number of metrology equipment

Research Teams: Biomechanics Team Research



Research Teams: Biomaterials Team Research



On-going project subjects

Bioactive molecules

*Functional, structural and regulatory analyses of molecular machines

*Purification and formulation of the naturally occuring antifungal proteins

*Structure/activity/stability analyses of antibiotic resistance proteins for new drug design

*Improving stability and activity of enzymes with potential medical uses

New disease markers

*Novel oncogene and tumor suppressor candidates located genomic instability regions

*Inflammatory pathways leading to development of colorectal cancer

*Processing, intracellular trafficking, and secretion of neuro/peptide hormones

*Detection of abnormally elevated or decreased expression levels of proteasomes by RAMAN spectroscopy

Mathematical Modelling

*applying image processing algorithms on medical images for 3D visualization of organs inside the body

*Numerical solutions for electromagnetic field problems

*Computational biomechanics

Imaging & analysis

*Electro-magnetic source imaging of the human brain

*Developing new ways of imaging

*Developing signal processing algorithms and applying them on biological signals

International and national research programs managed (last 5 years) by the BIOMED teams

National and International Projects

- **Total 135 / by 18 faculties**

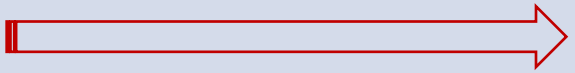
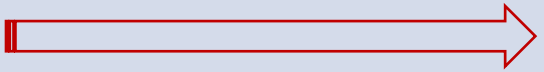
Sponsors

- **The Scientific and Technological Research Council of Turkey (TÜBİTAK), Turkish Academy of Sciences (TÜBA) ,Scientific Research Council of Middle East Technical University, T.R. Prime Ministry Satete Planning Organization (DPT)**
- **EU -FP6/FP7, -STREP, -Marie Curie , COST, British Council**
- **Industry**

Publications in SCI Journals

- **Total 150/ by 18 faculties**

Partnership with large facilities, university hospital and industries Partnership

University Hospitals	• **Hacettepe University Faculty of Medicine, Ankara University Faculty of Medicine and Teaching Hospital, Ankara University Faculty of Veterinary Medicine, Hacettepe University Faculty of Medicine,Gulhane Military Medical Academy /Faculty of Medicine** • **Hacettepe University Stem Cell Research and Application Center (PEDISTEM)**
METU Technopolis	• METUTECH 
METU CENTRAL LABORATORY	• 2 R&D Centers 

Core facilities of METU:

Central Laboratory-I

-Advanced Material Characterization R&D

electrical/optical and magnetic measurements, elemental analysis

Core facilities of METU:

Central Laboratory-II

-Molecular Biology and Biotechnology R&D

services in protein purification (HPLC, FPLC), DNA and protein sequencing, DNA synthesis, mass spectroscopy, FTIR, ESR, confocal laser scanning microscopy and image processing

Departmental Facilities: