

*Our network of mentors is grouped into the five educational programs detailed on the following pages. These educational programs reflect the major research programs of our department.*

### **Biomaterials & Tissue Engineering**

- biocompatible engineered materials*
- engineered materials for regenerative medicine*
- materials for drug and gene delivery*
- cell and tissue biomechanics in development, injury and healing*

Biomaterials & Tissue Engineering, a truly interdisciplinary program, combines cell and molecular biology, cell biophysics, and engineering methods to understand and control the organization and function of tissues. One practical goal is to supply tissues that can function normally when implanted in humans who lack, either due to disease or accident, the corresponding endogenous tissue function. Another goal is to design methods to control cell/tissue development.

Faculty in this program seek to develop new biomaterials to resist rejection and induce the regeneration of tissues; to discover new ways to deliver genes, drugs, and other biologicals; to reconstitute tissues from cells of various types to create replacements for tissues damaged by disease or trauma; and to understand the processes that drive cellular and tissue responses in development and in pathological states.

In addition to the outstanding experimental competence of Program faculty, several of the participating researchers provide broad expertise in the theoretical and mathematical aspects of Cell & Tissue Engineering.

## PROGRAM OF STUDY

Students in this program follow a course of study in accordance with the general regulations of the Department of Biomedical Engineering. Courses available to satisfy degree requirements include the following:

BME 511 Biotechnology Techniques for Engineers

BME 521 Kinetics of Receptor-mediated Processes

BME 523 Biomaterials Science

BME 524 Tissue Engineering

BME 525 Engineering Aspects of Biotechnology

BME 558 Biological Transport

BME 527 Design of Artificial Organs

BME 563 Orthopedic Biomechanics: Bones and Joints

BME 564 Orthopedic Biomechanics: Cartilage/Tendon

## PROGRAM FACULTY

Phil Bayly, Ph.D., *Quantitative characterization and modeling of brain trauma and development*

Paul C. Bridgman, Ph.D., *Basic cellular properties of developing nerve and muscle*

Donald L. Elbert, Ph.D., *Biomaterials, drug delivery, scaffolds for tissue engineering*

Anthony French, M.D., Ph.D., *Viral immunology, modeling pathogenic mechanisms*

Robert P. Mecham, Ph.D., *Extracellular matrix and its influence on the phenotype of cells*

Shelly E. Sakiyama-Elbert, Ph.D., *Biomaterials, drug delivery*

Jin-Yu Shao, Ph.D., *Cell mechanics, receptor and ligand interactions*

Matthew J. Silva, Ph.D., *Bone mechanics, tendon mechanics and repair*

Larry A. Taber, Ph.D., *Mechanics of brain and heart development*

Steve Thomopoulos, Ph.D., *Orthopedic mechanics, mechanics of tendinous cells and tissue*