Materials in Medicine at Penn State

Courses in the Application of Materials Science in Bioengineering

Biomedical and biotechnical applications of materials (biomaterials) require a delicate balance of chemical and physical properties tailored to the biological environment. Learn how biomaterials are used to improve human health care.

### Biomedical Materials
MatSE 403/508 (3 CR, Fall Semesters)
Professor Paul Brown

Survey application of ceramics, metals, polymers, and composites thereof in medical applications emulating the functions of hard and soft tissues. Among the topics to be discussed are materials used in blood contact (artificial veins and arteries), dentistry, orthopedics, and orthopedic tissue engineering.

### The Biological Response to Materials
MatSE 404/517 (3 CR, Spring Semesters)
Professor Erwin Vogler

Apply principles and tools of modern surface science to discover how the biological response to materials is controlled by surface properties. Among the topics to be discussed are blood coagulation, cell adhesion, and protein adsorption. Surface energy effects on biology will be emphasized.

**What you will learn:** Students will obtain a broad overview of biomaterials and surface science; learn how blood coagulates, wounds heal, and what “biocompatibility” really means. Significant emphasis will be placed on biomaterial characterization from a physical science/engineering perspective: 403/508 will focus on biomaterial preparation and physical properties; 404/517 will focus on the application of contact angle/wettability techniques and surface spectroscopy (esp. ESCA and SIMS).

**Prerequisites:** These courses were designed for chemistry/engineering students with little or no biology background and biology/biomedical students with little or no physical sciences background. Accordingly, prerequisites for the 403/404 biomaterials courses have been purposely held to a minimum (Chem. 13 or equivalent).

**Interested Students** are invited to inquire to Professors Paul Brown (865-5352; etx@psu.edu) or Erwin Vogler (863-7403; eav3@psu.edu).