Course Number: TXEN 2500  
Course Title: Biomedical Textiles  
Credit Hours: 3  
Prerequisites: None  
Corequisites: CHEM 1010 or CHEM 1030 or CHEM 1110

Date Syllabus Prepared: 18 March 2003

Text or Major Resources: Class Notes/Handouts

Course Description:

This course covers the major uses of fibrous materials in biomedical applications. A general introduction to fibers and woven, knitted, braided, and non-woven structures is provided. Historical uses of natural fibers in medicine as sutures and wound dressing are discussed. Modern uses of fibrous materials and assemblies are covered. Topics include sutures, artificial blood vessels, surgical nets, stents, tendons and ligaments, bone and dental cements, hard implants, hydrogels for drug delivery, artificial skin, filtration fabrics, anti-microbial finishes, surgical gowns and drapes, anti-clotting appliances, super-absorbent products, and fiber-reinforced composite prosthetic devices.

Course Objectives:

To provide an understanding of the major types of fibrous and polymeric materials used in medical/health applications in the past and to the present.

Course Content and Schedule:

Week 1

- Introduction to fibrous materials
- Chemistry and properties of fibers used in medicine
  - natural cellulosic and protein fibers (cotton, flax, silk)
  - synthetic fibers

Weeks 2 & 3

- Fibrous structures/properties
  - woven
  - knitted
  - non-woven
  - braided
  - composite materials
Week 3

- Historical uses of fibrous materials in medicine

Weeks 4 & 5

- Synthetic sutures and nets
  - structure
  - absorbable
  - permanent
- Degradation of properties
- Advances in suture materials

Week 6

- Arterial grafts and stents
  - construction and properties
  - anti-thrombosis
  - fatigue

Weeks 7 & 8

- Mid-term Examination
- Hard implants
  - knee
  - hip
  - shoulder
  - elbow
- Cements
- Fatigue

Week 9

- Hydrogels for drug delivery
- Artificial skin

Weeks 10 & 11

- Surgical gowns and drapes
  - microporous fabrics
  - antimicrobial finishes
- Filtration fabrics

Weeks 12 & 13
• Super absorbant materials
  o incontinency devices
  o surgical sponges
  o feminine hygiene products

Week 14

• Composite materials for prosthetic devices

Week 15

• Ethical issues
• Term paper due

Course Requirements/Evaluation:

Final course grade will be determined by grade a mid-term examination (33%), comprehensive final examination (33%), and a term paper (34%) due on the last day of class. The term paper will be a minimum of 15 pages and will cover, in depth, a topic of current research on fibrous materials in medicine. Grading scale: A = 100-90; B = 89-80; C = 79-70; D = 69-60; F = 59 and below.

Class Policy Statements:

Class attendance is strongly encouraged.