

BMA 513 - Polymeric Biomaterials

Fall 2009

cross-listed as MAE 608

Course Outline

Course Schedule: Mondays, 4:00-5:30pm and Fridays, 4:00-5:30pm

Location: 104 Parker Hall [South Campus]

Objective: To ensure that you become familiar with the vocabulary, definitions, compositions, and unique features of natural and synthetic polymeric materials, so that (1) practical decisions can be made regarding "biocompatibility" of these materials in different circumstances and (2) research articles in the current biomaterials peer-reviewed literature can be reviewed, comprehended, and authoritatively critiqued by course participants.

Format: Lecture, with discussion encouraged.

Grading: Will be graded on A-to-F basis. Each assignment (e.g. an exam) will be graded as a flat A, B, C, D, or F if completed on time. Assignments turned in late will be penalized by one partial grade level for each 48 hours that the assignment is delayed [e.g. a take-home exam that would have been a "B" if handed in on time, will begin at a grade of B- if handed in late; if 96 hours late, a grade of C+ will be assigned]. The +/- scale will be applied when the final course grade is calculated.

Evaluation: Your grade will be based on the following 5 main items:

- (1) Exam #1 (take-home) - 20% of course grade
- (2) Exam #2 (in-class) - 20% of course grade
- (3) Case Study, supported by an Abstract,
Written Paper, and Critical Discussion - 30% of course grade
[based on review of pertinent literature; topic will be assigned]
- (4) Final Exam – 20% of course grade
- (5) Attendance and Participation in Class - 10% of course grade

Other Requirements: Reading assignments (e.g. journal articles) may be given in advance of some sessions. These assignments will be given in the preceding class or no later than 5 days prior to the class session [e.g. by the preceding Monday for a Friday class], and will be communicated to you on the "UB Learns" site for this course.

Course Director: Robert E. Baier, Ph.D., P.E. (110 Parker Hall - UB/South Campus)
telephone: 829-3560 (110 Parker) 829-2055 (308 Squire - lab)
e-mail: baier@buffalo.edu

To make an appointment with Dr. Baier, contact him directly. You also are welcome to "drop in" to see if he is available for a meeting. It is best to call first and see whether he is in the office (110 Parker Hall), the lab (308 Squire Hall), or available at a later time.

Alternate Contact: Anne E. Meyer, Ph.D. (Faculty) e-mail: aemeyer@buffalo.edu

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Plan for Topics to be Covered

MONDAYS - Date and Topic	FRIDAYS - Date and Topic
31aug2009 - introduction and the basics; natural biopolymeric surfaces: skin, cornea, cartilage, dolphins, heart worms	04sep2009 – from methane to polyethylene; plasticizers, antioxidants, catalysts from polyethylene to polyacrylics; polyvinyls, polycarboxylates
07sep2009 – <i>Labor Day holiday - University is closed. No Class sessions.</i>	11sep2009 – Health Sciences Library Assignment on “Medical/Dental Polymers”
14sep2009 - collagen in skin, teeth, bone, and blood vessels; important structures of proteins	18sep2009 - tradenames: Dacron, Mylar, Teflon, Lexan, Lycra, Delrin, Plexiglass, Hydron
21sep2009 - alpha helix, beta structure & triple helix conformations; fibrinogen, fibrin, albumin, gamma globulin	25sep2009 –polyesters, polyethers, polyurethanes, polyacrylates , and Take-Home Exam issued*
28sep2009 – <i>Yom Kippur observed..No classes before 6PM.. No class in Polymeric Biomaterials</i>	02oct2009 –"RGP" polymers; silicone acrylates, contact lenses & IOL's; polyHEMA, hydrogels; hydrophobicity v. surface energy
05oct2009-- sterilization and surface modification of polymers	09oct2009 -- glycoproteins, proteoglycans; mucopolysaccharides; *Take-Home Exam Due ** receive case study & written paper assignment
12oct2009 - surface properties of biological polymers	16oct2009 – silicones: "medical" v. commercial"
19oct2009– In-Class Exam	23oct2009 –polyfluorocarbons: Teflon, GoreTex; particles v. "guided tissue" membranes
26oct2009 – polysaccharides, DNA, RNA, genomics, proteomics ** turn in Abstract for written paper	30oct2009 – polyhydroxyalkanoates; polyglycolides; polylactides; resorbable sutures
02nov2009 – bioprosthetic blood vessels; mandril grafts; tissue engineering	06nov2009 – dental adhesives; hybrid-layer bonding; advanced composites
09nov2009 – bioprosthetic heart valves; biological v. synthetic components	13nov2009 – prosthetic wear and friction: UHMWPE and sterilization effects
16nov2009 – glutaraldehyde tanning and crosslinking of protein-based tissues	20nov2009 – artificial hearts and LVADs (left ventricular assist devices) and valves
23nov2009 – biopolymeric adhesives, mussel glue, barnacle cement; "RGD" groups	27nov2009 – no class today (Fall Recess)
30nov2009 - **assigned papers due; Q/A	04dec 2009 - polymeric materials for tissue engineering
07dec2009- natural polymers for tissue lubrication and adhesion prevention	11dec2009- exam preparation
**Final Exam will be scheduled for exam week (December 14-21, 2009)	

** course requirement, in addition to class attendance and participation