ENGG 3170 COURSE OUTLINE– BIOMATERIALS
Fall Semester 2011

Instructor Information

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Course Description and Scheduling

Lecture Times: M, W, F – 11:30-12:20, Macdonald Institute (MINS) 103

Lab Times: T, Th - 12:30 - 2:20, Room 2193, Thornbrough Bldg.

Text: There is not an assigned textbook associated with this course. I will be using the University of Guelph Course link (D2L) to communicate with the class. You will automatically gain access to the course web page when you register for the course. Lecture notes will be posted before each lecture. The notes are not complete on their own, and it is still highly encouraged that you attend lectures to receive the full course notes.

Recommended Texts for reference:

Biomaterials Science – An Introduction to Materials in Medicine – Buddy Ratner, Alan Hoffman, F. Schoen and J. Lemons, Elsevier Academic Press, CA, 1996 (1st edition), and 2004 (2nd edtition).

Biomaterials – The Intersection of Biology and Materials Science – J.S.Temenoff, A.G.Mikos, Pearson Prentice Hall, 2008.

Marking Scheme

Marks will be assigned based on 4 experimental labs (weighted at 20%), three assignments (15%), one term project (15%), a midterm exam (20%) and a final exam (30%).

Laboratory reports are due the following Friday after completing the lab, and assignments will be due the following Friday after they are handed out – penalties for lateness (10% per day) will be applied.

Tentative Lecture Schedule

Topic	Lecture No. (Approximate Dates)
Introduction and Overview	1 (September 9)
Review of Basic Materials Science Concepts with biological applications - atoms and chemical bonding, stress, strain, tensile and compressive testing, hardness, toughness, fatigue, elasticity and viscoelasticity, thermal properties, surface properties	2-7 (Sept. 12-23)
Conventional Replacements for Biologic materials Including: Metals Polymers Ceramics Composites	 8 (Sept. 26) 9 (Sept. 28) 10 (Sept. 30) 11 (Oct. 3)
Biological Materials Including: Basics of biological tissue Cartilage Soft-tissue Bone	 14-15 (Oct. 5-7) 15-16 (Oct. 10-12) 17-18 (Oct. 14-17) 19-20 (Oct. 19-21)
Midterm Review Midterm (Tentatively)	21 (Oct. 24) Oct. 24th or 25th evening
Alternative Biologic replacements – tissue engineering Material Response: Corrosion Material Response: Wear	 21 (Oct. 26) 22-23 (Oct. 28-31) 24-25 (Nov. 2-4)
Cell Response: Engineering Aspects	26-27 (Nov. 7-9)
Cell Response: Inflammation and Infection	28-29 (Nov. 11-14)
Testing Methods of Biologic Performance and Ethics	30-31 (Nov. 16-18)
Project Presentations	32-34 (Nov.21 – Nov30)
Review	32-34 (Nov. 30-Dec. 1)
Final Exam	Dec. 13, 7-9 PM

Laboratory Experiments

Labs will begin the third week in September, and end mid-November. Labs will be completed in groups, which will be assigned and a schedule posted. Four laboratory experiments are planned as follows:

1. Tensile test of dental material.
2. Anisotropy - Compressive testing of bone.
3. Fatigue in Metals – Fatigue testing of metal specimen.
4. Determining Poisson's Ratio of Cartilage.

University Policy on Academic Misconduct

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