ENGG 3170 COURSE OUTLINE– BIOMATERIALS
Fall Semester 2009

Instructor Information

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Course Description and Scheduling

Lecture Times: M,W,F – 11:30-12:20, Crop Science 403

Lab Times: T, W - 2:30 - 4:20, 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 Assignments

Marks will be assigned based on 5 experimental labs (weighted at 20%), three assignments (10%), one project (15%), and a combination of the midterm and final (55%). The midterm will be weighted at 20% and the final at 35% of your final grade. In the event that a student wishes their final exam to be worth the full 55% of the grade (*i.e.* missed or failed midterm exam), this will be considered under personal consultation with the instructor. 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 11)
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. 14-23)
Conventional Replacements for Biologic materials	
Including: Metals	8 (Sept. 25)
Polymers	9 (Sept. 28)
Ceramics	10 (Sept. 30)
Composites	11 (Oct. 2)
Catch up and Review for Midterm	12(Oct. 5)
Midterm Examination (tentatively)	Oct. 8
Biological Materials	
Including: Basics of biological tissue	14-15 (Oct. 7-9)
Cartilage	15-16 (Oct. 14-16)
Soft-tissue	17-18 (Oct. 19-21
Bone	19-20 (Oct. 23-26)
Alternative Biologic replacements – tissue engineering	21 (Oct. 30)
Material Response: Corrosion	22-23 (Nov. 2-4)
Material Response: Wear	24-25 (Nov. 6-9)
Cell Response: Engineering Aspects	26-27 (Nov. 11-13)
Cell Response: Inflammation and Infection	28-29 (Nov. 16-18)
Testing Methods of Biologic Performance and Ethics	30-31 (Nov. 20-23)
Project Presentations	32-34 (Nov. 25-30)
Review	35 (Dec. 2)

Laboratory Experiments

Labs will begin the second week in October, and end mid-November. Five 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.
5. Finite Element Analysis of Bone.

Final Exam

Please note that the final exam date will have to be changed from the calendar description given for the 2009 academic semester. This will be done with class consensus upon consultation with the instructor. Please contact the instructor for further details.

University Policy on Academic Misconduct

Academic misconduct, such as plagiarism, is a serious offence at the University of Guelph. Please consult the Undergraduate Calendar 2009-2010 and School of Engineering programs guide, for offences, penalties and procedures relating to academic misconduct. http://www.uoguelph.ca/undergrad_calendar/08-amisconduct.shtml