University of Victoria Engineering

Faculty of Engineering
Department of Mechanical Engineering
COURSE OUTLINE

Mech481/BME481 – Biomaterials and Tissue Engineering

Term – Spring 2017 (201701)

Instructor	**Office Hours**
Dr. Stephanie Willerth	Days: MR or by email appointment
Phone: 250-721-7303	Time: After class
E-mail:willerth@uvic.ca	Location: EOW513

List all prerequisites and co-requisites: MATH 200 and minimum third-year standing in a BEng degree program

LECTURE DATE(S)

	Days: MR	Time: 1-2:30 pm	Location: DSBC122

TA Name	**E-mail**	**Office**
Henry Coll	hcoll@uvic.ca	ELW B133

Required Text	**Optional Text**
Title: Biomaterials : The Intersection of Biology and Materials Science	
Author: Johnna S. Temenoff and Antonios G. Mikos	
Publisher/Year: 2008	
Reference Materials: See material posted to CourseSpaces	

COURSE OBJECTIVES:

This course builds upon fundamental knowledge in material science to cover the different types of biomaterials and their associated properties and applications. It also discusses how to characterize such biomaterials using experimental techniques including microscopy, detection of chemical composition, protein adsorption and immunoreactivity. How the body responds to the implantation of biomaterials and medical devices will be examined along with investigation into how to combine biomaterials with cells to engineer. The necessary tests and the required standards required for biomaterials to be implanted into people are also given. The student's knowledge in these topics will be assessed through assignments, a mid-term exam, and a final project.

LEARNING OUTCOMES: At the end of this course, students will be able to:

- To understand what a biomaterial is and how it is defined by different groups
- To differentiate between the different applications of the different types of biomaterials
- List the major classes of biopolymers, their monomers and associated properties

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- List the important major events that take place in the typical wound healing process and relates these processes to biocompatibility
- Describe the properties of surfaces, how to characterize surfaces using experimental techniques and how these properties influence biocompatibility
- Discuss the basics of cell culture and the requirements of biomaterials for supporting cell growth in the context of tissue engineering

Weight & Date(s) of Assessments:	**Weight**	**Date**
Assignments:	25%	Throughout the semester
Mid-term	40%	March 9th during class
Final Project	35%	Last day of class

ASSIGNMENTS:

Six problem sets will be distributed over the course of the term via the MECH481/BME481 CourseSpaces site. Assignment hardcopy submissions are to be made to the MECH/BME481 dropbox located opposite ELW A136.

PROJECTS:

A detailed project description will be posted to CourseSpaces. The grade will consist of topic submission, outline submission, a final presentation, and a final report. The weighted percentages will be given in the project description.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

COURSE LECTURE NOTES

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

There will be no supplemental examination for this course.

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GENERAL INFORMATION

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

Attendance

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time….

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course." UVic Calendar, (2017) http://web.uvic.ca/calendar2017-01/undergrad/info/regulations/attendance.html#

Faculty of Engineering, University of Victoria
Standards for Professional Behaviour

"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals…."

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.
http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

Policy on Academic Integrity
http://web.uvic.ca/calendar2017-01/undergrad/info/regulations/academic-integrity.html#

Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.
The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Resource Centre for Students with Disabilities
http://www.uvic.ca/services/rcsd/

Accommodation of Religious Observance (AC1210)
http://web.uvic.ca/calendar2017-01/general/policies.html

Discrimination and Harassment Policy (GV0205)
http://web.uvic.ca/calendar2017-01/general/policies.html

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Course Schedule

Topic	Topics	Date/Week
1	Introduction to biomaterials and tissue engineering; The different classes of biomaterials and their associated properties	1-2
2	Bulk Properties of materials and characterization of materials	3-4
3	Biological polymers and cells	5
	Reading break	
4	Wound healing and inflammation	6
5	Host reactions to biomaterials and wound dressings	7
6	Cell culture, medical devices and tissue engineering	8
7	Midterm	9
8	Pre-clinical testing	10-11
9	Project Presentations	12

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