

A. COURSE OBJECTIVES:

The main objective of this multidisciplinary course is to provide students with a broad survey of biomaterials and their use in medical devices for restoring or replacing functions of injured, diseased, or aged human tissues and organs. Biomedical materials are rarely used per se, but always integrated into medical devices or implants. Wound dressings, vascular stents, artificial joints, dental implants, heart valves, intraocular lens are just a few examples from a very long list of medical devices in which biomaterials are engaged. The clinical success of such medical devices strongly depends on the properties of biomaterials used. The course is oriented towards biomaterials engineering, testing and applications in medical devices for surgery, implant and regenerative medicine. The focus is placed on design principles for medical materials. The topics to be covered include: biomaterials evolution in the medical device industry, a broad introduction to the materials used in medicine and their chemical, physical, and biological properties, different properties of synthetic and biological materials, materials interaction with the human body, basic mechanisms of wound healing, biocompatibility issues, testing methods and techniques in accordance with standards and relevant regulations, biofunctionalities required for specific applications, as well as the state-of-the-art approaches for the development of new regenerative materials targeting cellular mechanisms. By the end of the course, students should be able to identify material problems related to human medical health, understand the selection of replacement materials, design materials for use in particular medical applications, and choose proper analysis and testing methods for these materials.

B. BASIC INFORMATION

Course instructor: Prof. Wei Tan

Contact information: ECOT 516, Phone: (303)492239, Email: wtan@colorado.edu

Class hours & locations: 12 to 1:30pm, Mon, Wed & Fri

Office hours: By appointment ONLY on Wednesdays 2-6pm, may sit in a conf room

TA: Adrienne Scott Email: Adrienne.Scott@Colorado.EDU Office hours: 3:30 – 6pm.

Location: Idea Forge in the DIDL (Drop In Design Lab)

Grader: Parnaz Boodagh. Email: Parnaz.Boodagh@Colorado.EDU

Prerequisite courses Materials Science and College chemistry or biology

Web Page: D2L site: learn.colorado.edu

C. GRADING:

Midterm exam I: (Oct26)	20%
Midterm exam II: (Dec.7)	20%)

opportunities for you to participate during class. Be sure to complete the class assignments. Being an active and proactive student is crucial. Continuously showing leadership and critical thinking in these assignments will be rewarded with extra credits. If showing graduate level presentation or graduate level understanding during class participation, undergraduate students will get extra credit points.

† Graduate students: SBIR/STTR research proposal

Undergraduate students: Biodesign review paper. 10 bonus points for undergraduates who submit SBIR/STTR research proposal.

% Reading quizzes: Questions related to learning goals of each chapter. Open work online and graded online. Allow two attempts. Passing the quiz needs 80% or above accuracy which will result in full score or 100 on the quiz. If not pass the quiz (70% or below), your score will be the percentage of correct answers (e.g. 70). You are allowed to skip ONE assignment. In other words, the quiz with your lowest score won't count towards the final grade for quizzes.

For reading quizzes and homework assignments, students are required to work individually on all assignments. No late turn in except rare cases with convincing evidence present.

D. TEXTBOOK & SUGGESTED REFERENCE:

TEXTBOOK:

(Required) Introduction to Biomaterials: Basic Theory with Engineering Applications
Authors: C. Mauli Agrawal, et al. Published Cambridge University Press
ISBN: 9780521116909

(Optional) Biodesign : The Process of Innovating Medical Technology, 2nd Edition
Authors Paul G. Yock, et al. Published Cambridge University Press, 978052197867 -0 T

Any incident of academic dishonesty will lead to an automatic F grade for the course. Exchange of helpful suggestions is ok, but using another student's work (or allowing another student to use your work) is not ok. Description of academic integrity and climate is attached. Special issues: if you qualify for accommodations because of a disability, please submit to the instructors a letter from Disability Services in a timely manner so that your needs may be addressed. For details, visit this Web site: www.Colorado.EDU/disabilityservices. So students may have serious religious obligations which may conflict with academic requirements such as scheduled exams. The full text of the policy regarding this conflict can be read on the web at http://www.colorado.edu/policies/fac_relig.html. In addition, the University has recently adopted a student Honor Code, which is described at <http://www.colorado.edu/policies/honor.html>

Academic Integrity

You will be asked to complete individual homework assignments in this course. Though you may work in groups to discuss and solve problems, it is expected that you will abide by the University of Colorado at Boulder honor code at all times. Therefore, you must not

