Syllabus of MSE 470 (Fall 2020)
1. Title: Design and Use of Biomaterials
2. Description: We will cover various materials, in particular soft biomaterials (polymeric biomaterials), that have been designed and developed for biomedical applications. The course is designed for advanced undergraduate and graduate students who have basic background in organic and polymer chemistry, physics, biochemistry and materials science. The course integrates both materials science and biology, and is intended to enable students to understand the fundamental principles and knowledge associated with current biomaterials research, in particular polymeric biomaterials, and the biomedical applications of these materials.
3. Textbook and course materials
a. PowerPoint (PPT) slides, lecture notes given in class, research articles, related book chapters.
b. (optional reading) “Biomaterials: The intersection of Biology and Materials Science.” By Temenoff and Mikos
4. Lecture style: Zoom PPT presentation coupled with lecture notes to be written directly on the PPT slides, either pre-recorded or given real time in class.
6. Contents: The course will have several modules covering polymeric material design, synthesis of polymeric biomaterials, bioconjugation, materials degradation, biomaterial surface interactions, biocompatibility of materials, nano-biomaterials, and biomaterials applications in drug delivery, tissue engineering and diagnosis. Biomaterials devices and bioimplants will be briefly covered. Topics to be covered include:

   a. Introduction to biomaterials for biomedical applications: a brief overview of biomaterials and their applications
   b. Polymeric biomaterials: synthesis, design principles and properties (Organic and/or polymeric chemistry background required)
   c. Bioconjugation techniques (Organic chemistry background required)
   d. Degradation of biomaterials
   e. Biomaterial surface interactions and biocompatibility of materials
   f. Nano-biomaterials
   g. Biomaterials for drug delivery application (small molecules, gene and protein)
   h. Biomaterials for imaging and diagnosis
   i. Biomaterial and tissue engineering and cell-biomaterials interaction
   j. Biodevices and bioimplants
7. Assessments: One mid-term test, one final exam, one final group presentation, and a final group report
8. Grading: Exam-1: 20 pts (Oct. 8)
   Exam-2: 20 pts (Dec 10, tentatively)
   Homework: 40 pts
   Team project presentation 10 pts (Dec. 1, 3, 8) (~3 students per group) at 12:30-1:50pm for domestic/on-campus students. For international students/off-campus, the
presentation will be scheduled tentatively at 8pm of Dec 1 and 3.
Final group report 10 pts (due December 15 12pm (noon))
We attempt to use BOX for homework, report and exam uploading and grading
9. Schedule: Lecture T/R 12:30-1:50pm (Aug. 24 to Dec. 9). Lectures will be pre-recorded or recorded via Zoom lecture.
10. Instructor: Professor Jianjun Cheng (jianjunc@illinois.edu)
11.TA: Yujun Feng (yujunf2@illinois.edu)
12. Zoom Office Hours:
   Tuesday 8-9pm (international/off-campus), Wednesday and Friday 1-2pm (domestic/on campus). Zoom ID/Password will be provided later.
   If you need to reach TA or Dr. Cheng at a non-office hour time, please use email, or if necessary, schedule a time to discuss online via Zoom