

Biodesign Fall 2016



**BIOM 505 section 005, BME 598 section 003, CBE 499 section 001, CBE 515 section 002,
NSMS 595 section 003, ME 561 section 001**

Tuesday 4:00-6:30 pm

UNM Health Sciences Center, Clinical and Translational Science Center Building #227, Room 2145

UNM Center for Biomedical Engineering, Large Conference Room

Course Objective. To provide the student direct experience in the process of innovating medical technologies.

Learning Outcome. Students will be conversant in all core elements of Biodesign as practiced by a team comprised of a UNM Hospital physician, a UNM School of Engineering faculty member, and engineering students.

Course Description. "Biodesign" is a phrase widely used to describe a process by which an important clinical problem is identified, solved and translated to a ready-to-market product or process. As practiced in this course, biodesign begins with pairing a practicing physician with an engineering faculty member and several students. The initial task of each team is to learn from the medical doctor some area of their clinical practice plus various key problems in that area. The next task of the team is to generate an array of possible solutions to the problems posed. Under the guidance of the faculty leader, the resulting list of problems and potential solutions is winnowed to a single prime candidate for translation from idea, to lab prototype, to clinical product. The final product of each team is a presentation, invention disclosure, and a written proposal for subsequent research, development, and prototyping work.

Competition. On the last day of class, each of the teams will present their technology before a panel of judges. Also at this time, a funding proposal in the form of a UNM Clinical and Translational Science Center Pilot Project application will be submitted whose primary investigators are the SOE faculty team co-leader, and the physician team co-leader. Students will be expected to participate in writing and editing all portions of the proposal. The proposal will be for up to \$50,000 of bench-level research. At the conclusion of the meeting, the panel of judges will announce the winning team. Winning team members are encouraged to participate in Biodesign for an additional year (not required) where they will use their awarded funds for prototype development, steps toward commercialization, and generating preliminary data for NIH or NSF grant applications.

Topical area for Fall 2016. The clinical focus area for teams organized for Fall 2016 is *Emergency Medicine*.

Target students. Target students are those with an interest in engineering-based medical technologies, particularly those currently enrolled in the School of Engineering's Biomedical Engineering Graduate Program (BME), Chemical and Biological Engineering Graduate Program (CBE), Mechanical Engineering Graduate Program (ME), and Nanoscience and Microsystems Graduate Program (NSMS); and the School of Medicine's Biomedical Sciences Graduate Program (BSGP).

Faculty participants. The physician is [Dr. Justin Baca](#), Assistant Professor of Emergency Medicine at the UNM Health Sciences Center. The SOE faculty leads are: **TBD**. Lead Instructor for the course is [Dr. Christina Salas](#), Assistant Professor of Orthopaedics and Rehabilitation at HSC, and Assistant Professor of Mechanical Engineering; office hours by appointment; office location UNM Dept. of Orthopaedics faculty suite, 2nd floor, main hospital; office phone: 505-272-5671; e-mail: chrsalas@salud.unm.edu. Course mentors are [Dr. Eric R. Prossnitz](#), Professor of Internal Medicine at the Health Science Center; and [Dr. Andrew P. Shreve](#), Professor of Chemical and Biological Engineering, and Director of UNM's Center for Biomedical Engineering.

Prerequisites. Permission of the lead instructor. Graduate students in engineering or health sciences are preferred. Also considered for admission are exceptional undergraduate students in the shared credit program with prior bench-level research experience. Members of the winning team will have the opportunity to participate in Biodesign for up to an additional year. It is strongly recommended, but not required, that participating students consider this opportunity in order to take full benefit of the course.

Credit. This 3-credit course is expected to be an approved elective for most students in the School of Engineering and the Biomedical Science Graduate Program.

Tuition and fees. Ordinary university tuition and fees applies.

Textbooks. A reference textbook is available for this course, "Biodesign: The Process of Innovating Medical Technologies", Eds. S. Zenios, J. Makower and P. Yock, Cambridge University Press. The price on Amazon is approximately \$100 new. Purchase of the book is not mandatory. A copy will be on reserve at Centennial Science and Engineering Library.

Assessment. There is neither graded homework nor exams. Students will be assessed based on observation of the team co-leaders and by Dr. Salas in the following areas: (i) understanding and practice of the biodesign process; (ii) participation and attendance; (iii) ability to work well with fellow team members; and (iv) technical viability of final presentation. Written assessments in these areas will be provided mid-term to each student.

Grading. A course grade will be assigned based on a weighting of the above assessments as follows:

Midterm evaluation	35%
Final evaluation	65%

In-clinic Observations. One or more in-clinic observations are probable. Student participation in these observations is mandatory.

Students with Disabilities. If you are a qualified student with disabilities who needs appropriate accommodations to participate in clinical observations and/or any other physical activity associated with the course, you must communicate with Dr. Salas as soon as possible, and no later than course registration, so that arrangements can be made.

Intellectual property. Intellectual property generated by students and other team members is handled according to standard UNM policy, i.e., the intellectual property is owned by the university, and available for licensing through UNM's designated licensing agent STC.UNM.

Hours. After the first seven in-class meetings, the meeting hours of each team are likely to vary depending on the pacing and progress of the work of generating a proposal. Subsequent meetings will be scheduled on an as-needed basis, consistent with the schedules of all team members.

Course Schedule.

	Day	Date	Topic	Lead	Location
1	T	Aug 23	Overview of biodesign methodology	Salas	CTSC 2145
2	T	Aug 30	Physician's informal discourse + problem statements	Physician Lead	CTSC 2145
3	T	Sept 6	Clinic visit with physician + possible solutions	Physician Lead	TBD
4	T	Sept 13	Evaluating the problem statements + possible solutions	Faculty Leads	CBME large conf rm
5	T	Sept 20	Selecting a problem statement and candidate solution	Faculty Leads	CBME large conf rm
8	TBD	Sept 27 - Dec 11	Team meetings TBD	Faculty Leads	TBD
9	TBD	Week of Dec 12	Students' presentation of proposals before judging panel	Salas	CTSC 2145