1. **BENG 187A: Bioengineering Design Project: Planning**
2. Credits and Hours: 1 unit credit;

2 hours lecture, 1 hour outside preparation

1. Instructor: Alyssa Taylor
2. Text book:

Recommended reading: Biodesign: The Process of Innovating Medical Technologies; Paul G. Yock, Stefanos Zenios, Josh Makower, Todd J. Brinton, Uday N. Kumar, F. T. Jay Watkins, Lyn Denend, Thomas M. Krummel, and Christine Q. Kurihara; Cambridge University Press, 2015.

1. Specific course information
2. Course (Catalog) Description:

General engineering design topics including project planning and design objectives, background research, engineering needs assessment, technical design specifications, engineering standards, and design requirements and constraints. Introduction to biomedical and biotechnology design projects. Career and professional advising. Majors must enroll in the course for a letter grade in order to count the sequence toward the major. No exceptions will be approved.

1. Prerequisite(s):

BENG 112A or BENG 152 or BENG 168 or BENG 181, majors only; or consent of department.

1. Required or Elective course:

*Bioengineering: BioSystems*: Required

*Bioengineering: Bioengineering*: Required

*Bioengineering: Biotechnology*: Required

1. Specific goals for the course:
2. Specific Outcomes of instruction:

* This is the first (BENG 187A) quarter in the 4 quarter sequence of the Bioengineering Capstone Design program (BENG 187A-D). The goal of the entire sequence is to gain knowledge and experience with the engineering design process for medical and biological applications, with a hands-on project in a UC San Diego, Research Institute, or Industrial laboratory/engineering facility. The sequence consists of 4 one-unit lecture courses (Spring, Fall, Winter, and Spring quarters), and an accompanying series of two three-unit design courses (Fall and Winter quarters, BENG 188A (Design Development) and BENG 188B (Design Implementation).
* Students will:

- Apply engineering knowledge to develop multiple, creative solutions to meet a design need

- Perform technical and feasibility analysis to select the best design solution

- Improve communication (oral and written) and teamwork skills essential for continued professional success

- Examine the role of intellectual property and technology transfer in engineering practice

1. Educational Outcomes addressed by the course:

(1): Identify, formulate, solve complex eng. problems by applying principles of engineering, science, math  
(2): Apply eng. design to produce solutions that meet specific needs with standards and constraints due to: public health, safety, welfare and global, cultural, social, environmtl, economic factors

(3): Communicate effectively (written and oral) with a range of audiences  
(4): Recognize ethical and professional responsibilities in eng. situations and make informed judgements with the impact of eng. solutions in global, economic, environmental and societal contexts

(5): Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, (inclusion of diversity) and establish goals, plan tasks, and meet objectives

(6): Develop and conduct appropriate experimentation, analyze data, and use eng. judgement to draw conclusions  
(7): Acquire and apply new knowledge as needed, using appropriate learning strategies (life-­long learning)

1. Topics covered:
   * Models of the design cycle
   * Needs assessment
   * Problem Formulation (including goals and specifications)
   * Brainstorming
   * Analysis of potential design solutions
   * Medical device case studies
   * Patents
   * Regulatory pathways
   * Technical communication (including maintaining a design notebook)

Prepared by Alyssa Taylor (2024)