

**BENG 187A Bioengineering Design Project: Planning**  
**Spring 2022**  
V 1.1

**Instructors and Email Addresses**

**Instructors (Zoom office Hours on line to be posted on CANVAS; email for individual Zoom meetings)**

Bruce Wheeler	<a href="mailto:bcwheeler@ucsd.edu">bcwheeler@ucsd.edu</a>
Anahid Fouroughshafiei	<a href="mailto:aforough@ucsd.edu">aforough@ucsd.edu</a>
Bryan Nguyen	<a href="mailto:brn026@ucsd.edu">brn026@ucsd.edu</a>
Mina Wu	<a href="mailto:ymwu@ucsd.edu">ymwu@ucsd.edu</a>
Sicily Panattil	<a href="mailto:spanatti@ucsd.edu">spanatti@ucsd.edu</a>

**Lecture: 119 Center Hall**, Wednesdays and Fridays 1:00-1:50. Attendance is taken in person. Lectures will be recorded via podcast and zoom, but for only those with validated excuses.

**Course Materials on CANVAS – powerpoints for each lecture**

**Website for Senior Design Including Projects:** <http://beweb.ucsd.edu/courses/senior-design/index.shtml>  
(or Google UCSD BioE Senior Design)

**Educational Philosophy and Course Goals**

Most importantly, this course works to assign juniors to their senior design projects. The course also aims to introduce juniors to the quality of work expected – by senior mentors and by attending senior oral and poster presentations. Teamwork is emphasized throughout with multiple assignments. Also important is learning to ask questions of speakers and presenters.

**Classroom Instruction**

The principal delivery methods are: (1) live in person lectures for half the class period followed by breakout teamwork in the lecture hall; (2) attending team reports given by seniors; (3) attending Bioengineering Day and posters presented by seniors; (4) a Saturday “Hackathon” brainstorming day; (5) meeting with seniors to gain insights into how to succeed in senior design.

**Most important requirement**– active participation in and pursuit of a project for the coming academic year.

**Background – Brief Overview of Senior Design and BENG 187 and project courses BENG 1XXA/B**

BENG 187A – orientation and project generation  
187B – formal proposal writing  
187C – background for Bioengineers (FDA, IRB, Standards, etc.)  
187D – presentation skills  
BENG 1XXA formal project proposal, start work; BENG 1XXB implement project.

**BENG 187A**

**Creating and Committing to Projects**

1. Hustling to Create Projects, Convince Mentors and Signing Up For Projects

**Starting Your Project**

2. Literature review / patent search: done over summer; due before the first class in Fall as part of BENG 187A.

**Activities / Assignment – all in-person**

0. You will be assigned to a team for the quarter. (This is NOT your project team for 2021-22.)
1. Attend presentations (1:00-1:50 pm Wednesdays); complete short assignments. Attendance taken using “selfies”
2. Sign up for at oral presentations by seniors (Wednesdays 10, 11, or 12; first five weeks).
3. Attend poster presentations by seniors, including one for your assigned team, on Bioengineering Day
4. Meet with senior team for mentoring session
5. Meet in successive brainstorming sessions
6. Summer meeting with instructors to get process started
7. Literature review and patent search (due first day of Fall Quarter)
- 8.

## Your Team

You have already been assigned to a team of 3 to 6 juniors. In turn, your team is matched with one of the senior teams. (Separate email/listing on CANVAS). The matching is done to maximize the congruence of each junior's major to the majors of the seniors on the matching teams. This is your BENG 187A team. You will have an entirely different team for your senior design project.

It is possible that we will switch up teams half way through the quarter.

## Meetings with Senior Project Mentors

In addition to the poster presentation (see below), your team and your matching senior team must arrange for an on-line session to discuss your questions and their advice for how to maximize your senior design experience. You will be required, as a team, to submit a report on that meeting. The due date will be approximately five weeks into the quarter.

## Bioengineering Day Poster Session:

You will attend multiple poster presentations by seniors. Mandatory is attending the poster presentation by your matched senior team. You will be judges of the posters, including voting for best poster awards.

## Senior Oral Presentation Attendance

You will hear multiple presentations as part of BENG 187A. You are required to attend one other presentation hour on Wednesdays at 10, 11 or 12 in the first half of the quarter.

## Project Generation and Assignment (see <http://beweb.ucsd.edu/courses/senior-design/index.shtml>)

Project generation proceeds along several paths:

1. Prof. Wheeler recruits projects from faculty and industry; often these are continuations of previous projects.
2. Students recruit faculty to sponsor a project; very often this occurs for students who have worked in their laboratories.

Assignment occurs in one of three ways:

1. Students who have worked with a faculty member to identify a project are assigned to that project and may recruit other students to the team.
2. Students may approach faculty proposing a project; if there is sufficient mutual interest, a team is assigned.
3. Students express a preference for listed projects and Prof. Wheeler assigns students doing his best to balance student interests and skills needed to carry out the project.

Usually one or two student initiated projects are pursued; projects from EWH or similar organizations are encouraged. Occasionally teams recruit a team member from another JSOE major – sometimes the student can get credit for the activity. While there are no formal senior project sharing courses, we will work with students and other departments to see if there is a match to be made.

*Students are encouraged to be highly proactive in contacting faculty for projects. This is especially true this spring due to the greater difficulties in communication due to restricted in person courses and research opportunities in the last two years.*

## Grading for BENG 187A:

- 30%: Literature and
- Patent Review. Individual Lit Review (10%) and Patent Review (10%) and teams Lit + Patent Review (10%). Must be submitted before the first lecture in Fall 2021! Late penalties will be enforced.
- 10% Participation in a Senior Oral Report
- 10% Participation in a Senior Poster Report
- 10% Report of Meeting With Senior Mentor Team
- 10% Meet with Instructors early summer. Failure to meet will reduce your grade for BENG 187A.
- 10% Meet with Project Mentor – must be done before mid-summer (date to be determined).
- 20% Brainstorming and Class Assignments

## Grading for BENG 187ABCD

Each of BENG 187A, 187B, and 187C is graded IP “in progress” until completion of BENG 187D, at which point the BENG 187D grade is propagated to each of the others so that the same grade appears for all four. We keep “shadow grades” for each quarter and use them toward the final grade, so that the grade entered for BENG 187D is the average of the shadow grades for all four quarters. Hence the formula above is for the BENG 187A shadow numeric grade, which is converted to a shadow letter grade, and is one-fourth of your overall grade for BENG 187ABCD.

## Lecture Content

There are four lecture period components

1. Course introduction including online procedures, expectations, project assignment, advice
2. Specific assignment background, including literature review and patent search, also first assignments for the formal design work to be done in the fall
3. Teamwork exercises – usually the second half of the lecture period, but also including brainstorming sessions
4. Senior Design Background Topics. These range from ethics to FDA to technology speculation. Several will be chosen for Spring 2020, with the rest being presented in either Fall 2020 or Winter 2021. At this writing the choice of topics for this spring has not been finalized.

## Weekly Schedule – see separate file for

March 31, April 2 – Overview of Course; Assignment to Be an Audience for Senior Talks

April 07, 09 – Project Overview, Topical Lectures: Ethics

April 14, 16 – Topical Lecture: Technology in Bioengineering, Bioengineering Day

April 21, 23 – No Lectures; Bioengineering Day on Friday

April 28, 30 – Brainstorming 1 and 2

May 05, 07 – Brainstorming 3; Topical Lecture: Careers in Bioengineering.

May 12, 14 – Topical Lecture: Careers in Bioengineering

May 19, 21 -- Finding Projects; Summer Assignment: Literature Review and Patent Search

May 26, 28 – First Fall Assignment – the Needs Statement; Summer Assignment and Wrap Up

June 02, 04 – Wrap Up and The View From Teaching Assistants, what goes right and what goes wrong

## Attendance

Attendance will be inferred from either:

- (a) individual submissions of short answers to questions from the lecture.
- (b) “selfie” team pictures taken in the lecture hall

## The BENG 1XXA/B Courses

Each student takes one BENG 1XXA in Fall and the corresponding BENG 1XXB course in winter. Each is a 3 credit course and accounts for your project activity as opposed to the overview activity in BENG 187ABCD.

The instructors will assign you to the appropriate course. The current rationale is to have recorded on your transcript a description which best matches your project. There is a historical (but no longer operative) rationale that established the courses and their titles.

Critical: take matching courses – i.e. [BENG 127A and BENG 127B] but not [BENG 127A and BENG 169B]. Or you won't graduate.

All BENG 1XXA courses are “Design Development in ...”

All BENG 1XXB courses are “Design Implementation in ...”

- BENG 119A/B ... Biomechanics
- BENG 126A/B ... Bioinformatics
- BENG 127A/B ... Molecular Systems
- BENG 128A/B ... Genetic Circuits
- BENG 129A/B ... Cell Systems Bioengineering
- BENG 139A/B ... Molecular Bioengineering
- BENG 147A/B ... Neural Engineering
- BENG 148A/B ... Cardiac Bioengineering
- BENG 149A/B ... Vascular Bioengineering
- BENG 169A/B ... Tissue Engineering
- BENG 179A/B ... Bioinstrumentation