

Sutardja Center for Entrepreneurship & Technology
UC Berkeley
scet.berkeley.edu

Course Number: INDENG 185- section 4

Course Title: **Challenge Lab- Product Design of Plant-Based Foods**

Semester: SPRING- 2020

Instructor(s): Ricardo San Martin, rsanmartin@berkeley.edu

GSI or Course Coordinator(s): Elena Kharitonova, ekhar17@berkeley.edu

Meeting Day/Time: MW 4:00P-5:59P

Meeting Location: | 3113 Etcheverry

Grading Basis: Letter grade, P/NP, S/U

Course Format: 2 h lectures or instructor-led workshops / team projects (4-person max)

Office Hours: [M/time] at Sutardja Center for Entrepreneurship & Technology- Stadium space

Final Presentation and/or Final Exam: Final presentation during recitation week- May, 2020

Course Website: <https://bcourses.berkeley.edu/courses/1489000>

Course Prerequisites- None- preferable background in biological sciences, chemical engineering, plant biology, business and related subjects.

Course Objectives

In this class you will learn the entrepreneurial skills required to design novel plant-based foods capable of triggering massive consumer change and positively impacting our world. By looking in depth into how existing PBF are produced: plant-based milk, meat, cheese, etc., you will develop research skills to navigate this until now secretive research and production landscape. This will allow you to develop an independent point-of-view to critically assess the present narrative developed by the PBF and if these products will truly generate the positive impact that they promise.

Working in teams you will design an original and meaningful PBF, based on a thorough understanding of the scientific and technological foundations needed for its production: food microstructure-macrostructure relationships, texture and flavor chemistry, manufacturing processes (scaling-up), quality assurance, regulatory issues, etc. The project will involve product design (iterative prototyping), production process, inputs (raw materials, utilities, etc.) and outputs of the process (unwanted by-products, secondary products, effluents, etc.), sizing of equipment, production costs and estimated income, distribution and marketing issues, identifying potential partners, among others. The projects will draw upon our network of scientists, entrepreneurs, collaborating companies (Nestle, Givaudan, Miyoko, etc.), venture capitalists, etc.

At the end of this course you will have gained knowledge and/or experience in the following areas:

- Independent and team-based research skills to understand how novel PBF are manufactured and critical skills to assess if the products are healthy, sustainable and affordable.
- Scientific and technological principles involved in the production of present and future PBF.
- Effective teamwork skills to explore this new landscape and identify opportunities for novel ventures
- Skills to develop from concept to market innovative and meaningful PBF.

Textbook/Resources

- Research papers/videos/ book chapters/industry studies will be provided in the web site by the instructor

Assignments

Independent reflections: You will be asked to develop your own independent research skills to understand the scientific, technological and cultural hurdles needed to effectively design meaningful and impactful PBF. To accomplish this, you will be required to submit 8-10 independent reflections around specific questions provided by the instructor.

Readings: the class relies heavily on your passion to learn about plant-based foods, by reading numerous research papers, book chapters, etc. provided by the instructor and by your own research. These readings are meant to be read before each class. In some classes, you will be examined on the readings.

Project: The team-based, semester-long project has three team-based presentations and one final presentation in front of a jury composed by entrepreneurs, scientists, venture capitalists and collaborating companies. Project details are given in a separate handout (project brief).

Attendance/Participation- regular attendance to classes is required to pass. Because the course is largely based on group participation, mandatory attendance is to your benefit. If you have an unexpected problem, you need to communicate this in advance to the instructors. If you do not do this, you will be marked as absent. No lap-top rule: no laptops will be allowed during the classes, unless used to take notes or for a class activity.

Grading

Semester-Long Team Project (70%): Your team project will make up the bulk of your grade. Three interim presentations are worth 15% each, plus one final presentation at 25%. Please see the project brief for details.

Reflections/reading quizzes (20%): You will be asked to complete a weekly or bi-weekly reflection based on questions/activities defined by the instructor. In some classes you will also be asked to complete a quiz on assigned readings.

Team dynamics (10%): at the end of the course each team member will be asked to evaluate the contribution to the project of other members (see below).

Course Evaluations

At the end of the term, students will be asked to fill out an evaluation to give feedback about the course. SCET values and appreciates student responses, which are used to better understand and improve our courses. Students are strongly encouraged to submit the evaluation.

Weekly Schedule (tentative)

The following schedule is meant to provide a broad outline of the course material and structure. However, it is not set in stone and may be modified as the semester unfolds. Any updates will be communicated via bcourses.

Week	Date	Class	In a nutshell
1	22-Jan	Introduction	Welcome-class details- project-grading-rules-teams- Animal welfare talk
2	27-Jan	Food basics-1: food components	Main food components- Nutritional labels-Ingredients
	29-Jan	Food basics-2: proteins	High level introduction to PBF. Introduction to proteins Nutritional values (PDCAAS)
3	3-Feb	Food Basics-3: microstructure & transformations	Food microstructure, texture and hierarchy. Effects of heat, pH , salts, etc.
	5-Feb	Food basics-4: texture & Flavor	Molecules, structure, texture perception/How we perceive flavors. Natural and artificial molecules
4	10-Feb	Case 1: Plant Based Mik-1	Understanding real milk. Microstructure. Production process. Functionalities
	13-Feb	Case 1: Plant Based Mik-2	Oat-Milk: microstructure oat grain, production process
5	17-Feb	NO CLASS	
	19-Feb	Case 1: Plant Based Mik-3	Oat-Milk: commercial products and production challenges
6	24-Feb	Case 1: Plant Based Mik-4	Oat-Milk: Production process, flowsheet, equipment selection, cost estimation
	26-Feb	Flavor	
7	2-Mar	Preparation Presentation 1	Teams polish their pitches
	4-Mar	Presentation 1	
8	9-Mar	Economics of production processes	Flow sheet design, mass energy- balances, capital, COGS,ROI
	11-Mar	Case 2: Plant-based Meat-1	Understanding real meat
9	16-Mar	Case 2: Plant-based Meat-2	Products, Raw materials, production process
	18-Mar	Case 2: Plant-based Meat-3	Production process: Extrusion
10	23-Mar	NO CLASS	
	25-Mar	NO CLASS	
11	30-Mar	Chefs perspective	Chefs perspective of plant-based foods
	1-Apr	Preparation Presentation 2	Teams polish their pitches
12	6-Apr	Presentation 2	
	8-Apr	The entrepreneur's perspective	TBD
13	13-Apr	Case 3: Plant-based Cheese-1	Understanding real cheese/fermentation
	15-Apr	Case 3: Plant-based Cheese-2	Plant-Based Cheese Fermentation MIYOKO
14	20-Apr	Case 3: Plant-based Cheese-3	Plant-Based Cheese Bottom-Up approach
	22-Apr	The VC perspective	
15	27-Apr	Preparation Presentation 3	Teams polish their pitches
	29-Apr	Presentation 3	
	6-May	Final Presentation	

Scheduling Conflicts

Please notify me in writing as soon as possible about any known or potential extracurricular conflicts. I will try my best to help you with making accommodations but cannot guarantee them in all cases.

Student Code of Conduct & Academic Integrity

UC Berkeley's honor code states "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." As a Cal student, you are held to the University's [Student Code of Conduct](#). You are expected to demonstrate integrity in all of your academic endeavors and will be evaluated on your own merits.

Any assignment submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course unless you obtain prior written approval to do so from your instructor. In all of your assignments, you may use words or ideas written by other individuals, but only with proper attribution. To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism, self-plagiarism, and how to avoid it, see [Berkeley Library website](#).

If you are not clear about the expectations for completing an assignment or taking a test or examination, be sure to seek clarification from your instructor beforehand. Anyone caught committing academic misconduct will be reported to the University Office of Student Conduct. Potential consequences of cheating and academic dishonesty may include a formal discipline file, probation, dismissal from the University, or other disciplinary actions.

Student Accommodations

The University is dedicated to supporting student success and removing barriers to educational access. If you need disability-related accommodations in this class, have emergency medical information you wish to share with me, or need special arrangements in case the building must be evacuated, please inform me immediately so that we can plan for appropriate accommodations. The Disabled Students' Program (DSP) is the campus office responsible for authorizing disability-related academic accommodations, in cooperation with the students and their instructors. Students who need academic accommodations, or have questions about their eligibility, should contact DSP. See the [DSP website](#) for additional information.

Counseling and Psychological Services (CAPS)

As a student, you may experience mental health concerns or stressful events that can cause barriers to learning, participation and performance. The University offers a broad range of mental health services available on campus via the Counseling and Psychological Services (CAPS). There is no charge to get started, and all registered students can access services regardless of insurance. For details on the CAPS resources, see the [CAPS website](#).

Prevention of Harassment and Discrimination

The University is committed to creating and maintaining a community dedicated to the advancement, application and transmission of knowledge and creative endeavors through academic excellence, where all individuals who participate in University programs and activities can work and learn together in an atmosphere free of discrimination, harassment, exploitation, or intimidation. For more information on related policies, resources and how to report an incident, see the [Office for the Prevention of Harassment and Discrimination \(OPHD\) website](#).

Safety and Emergency Preparedness/Evacuation Procedures

As class activities may keep you on campus at night, check out the Cal's [Night Safety Services website](#) for details on the University's comprehensive free night safety services. See the [Office of Emergency Management website](#) for details on Emergency Preparedness/Evacuation Procedures. The UC Berkeley [Police Department website](#) also has information regarding safety on campus. Dial 510-642-3333 or use a Blue Light emergency phone if you need help.

Grievances

If you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor. Then, if necessary, take your case to the SCET Chief Learning Officer, SCET Faculty Director, IEOR Department Chair, and to the College of Engineering Dean, in that order. Additional resources can be found on the [Student Advocate's Office website](#) and the [Ombuds Office for Students website](#).

Additional Resources

See the [Student Affairs website](#) for more information on campus and community resources.

SCET Certificate in Entrepreneurship & Technology

This class can be used towards requirements to earn the SCET Certificate in Entrepreneurship & Technology. For details on the certificate requirements and other opportunities to engage with the Center, see the [SCET website](#).

Disclaimer: Syllabus/Schedule are subject to change.