ESM 284 - SUSTAINABLE PRODUCT DESIGN - Spring 2025

INSTRUCTOR:

Prof. Eric Masanet, Bren School of Environmental Science and Management, emasanet@ucsb.edu

OFFICE HOURS:

Mondays 1:00-2:30pm, Bren 3510

LECTURE:

Tuesdays and Thursdays, 12:30pm - 1:45pm, Bren 1414

TEACHING ASSISTANT:

Shantal Adajian, Department of Mechanical Engineering, shantaladajian@ucsb.edu

OFFICE HOURS:

Wednesdays, 3:00-5:00pm, location: ESB 2003

COURSE WEBSITE:

We will utilize Canvas for course documents, assignments, schedules, policies, and other course resources. Course announcements will be made via Canvas.

COURSE SUMMARY:

This course will introduce students to the process and principles of sustainable product design, including how to set sustainability goals specific to a given product or system, connecting these visions to actionable design tools and methods to realize these goals, and using concrete metrics for evaluating degrees of success. Concepts covered include whole systems mapping, using of life-cycle data for priority-setting, material and energy impacts literacy, low-impact materials selection, design for efficiency, design for recycling, circular design, user-centered design, and products as services. Students will learn and apply these concepts in product-specific exercises that align with major design process steps.

GRADING:

Design team homework 60% (6 assignments @ 10% each)

Final exam 30%

Participation 10%

READINGS:

There is no course textbook. Selected brief readings and/or videos will be included as part of homework exercises, which will require substantial out-of-class research and work.

PRODUCT TEAMS:

Because product design is a team process, early in the course students will be assigned to design "teams" that will apply course methods and tools to the sustainable (re)design of specific products. Design teams will submit one homework assignment per team. Equal participation is expected across homework assignments, but teams are free to decide upon any division of labor across assignments that is acceptable to everyone. Each team member will also submit a peer review assessment at the end of the quarter for accountability.

HOMEWORK

Homework assignments should be submitted via Canvas by 12pm PT on the due dates listed in the course schedule below. Each design team should upload a single submission.

PARTICIPATION:

This course will use an interactive format in which questions, discussions, and group learning will be highly encouraged. To receive a full participation grade, students should make reasonable efforts to contribute to these conversations during the lectures.

OFFICE HOURS:

Weekly office hours will be held in "open door" fashion, meaning any ESM 284 student can join the discussion at any time. This format will enable students to learn from each other's questions and facilitate cross-project learning. Students who wish to discuss course questions or issues privately should email the instructor to set up an appointment outside of office hours.

ACCOMMODATION OF SPECIAL CIRCUMSTANCES:

Please see the instructor for accommodation of religious beliefs, disabilities, and other special circumstances.

COURSE MATERIAL USE POLICY:

All course materials (class lectures and discussions, handouts, assessments, web materials) and the intellectual content of the course itself are protected by United States Federal Copyright Law, the California Civil Code. UC Policy 102.23 expressly prohibits students (and all other persons) from recording lectures or discussions and from distributing or selling any course materials without the prior written permission of the instructor. See policy.ucop.edu/doc/2710530/PACAOS-100. Students are permitted to make notes solely for their own private educational use. Exceptions to accommodate students with disabilities may be granted with appropriate documentation. To be clear, in this class students are forbidden from completing study guides and selling them to any person or organization. This text has been approved by UC General Counsel.

COURSE SCHEDULE (subject to change)

Week	Date	Topic	Homework (see Assignments for due date/time)
1	1-Apr	Introduction	
	3-Apr	Defining success	
2	8-Apr	Whole system mapping	
	10-Apr	Priority setting	
3	15-Apr	Stakeholder and needs identification	
	17-Apr	Materials selection I: Broad concepts	HW1: Defining success
4	22-Apr	Materials selection II: Metals	
	24-Apr	Setting design goals	HW2: Whole systems map
5	29-Apr	Materials selection III: Plastics	
	1-May	Fibers/Low-impact materials selection	
6	6-May	Dematerialization/light-weighting	HW3: Impact and issue prioritization
	8-May	Brainstorming	
7	10-May	Design for recycling	
	15-May	Design for reuse/repair/refurbishment	HW4: Design goals
8	20-May	Design for energy efficiency	
	22-May	Products as services	HW5: Brainstorming solutions
9	27-May	User-centered design/behavior	
	29-May	Guest panel interview	
10	3-Jun	Presentations	HW6: Solution selection, justification, and communication
	5-Jun	Presentations, wrap-up	
11	9-Jun	Final exam (12pm)	Take-home exam released