The second implementation of MAE 4340, Innovative Product Design via Digital Manufacturing, will be available to a limited number of students. Those senior undergraduates in MAE interested in this course are encouraged to submit a one page essay on why they believe this class could help them in their future careers. In this essay, the students should also list their level of interest in improving their written and oral communication skills, as well as confidence with implementing ANSYS and CAD (preferably using Solidworks), their prior experience in conducting experimental research, and their level of comfort with talking to potential product users (e.g., parents, children, other students). Please email rfs247@cornell.edu with your essay and include “Essay for 4340” in the subject line. Please include whether you are taking this for a major approved elective, or fulfilling the senior design elective.

MAE 4340/4341 is a course about new product development that uses digital manufacturing tools (e.g., 3D printers and laser cutters) to rapidly produce physical prototypes of the product concept. In this course, we will fabricate functional prototypes of mechanical designs and iterate these concepts into final form by garnering information from mechanical testing, voice of consumer interactions, and considerations of their manufacturability and assembly potential.

In detail, the students will operate under the constraints of a fictitious company with existing product lines and limited manufacturing capabilities (e.g., solely injection molding of plastics). After a few weeks of introductory topics and training on the prototyping tools, the students will be assigned teams via a computerized matching process. Using guided concept generation methods, the teams will build digital representations of their machine designs and estimate their feasibility using analytical and numerical methods. Once a digital design has been reached, the teams will create physical prototypes for mechanical testing, and reviews from potential customers. Using feedback from their testing, the students will change their digital design and iterate new prototypes for further testing.

Several guest lecturers will give the class perspective about market analysis, and product development in small-tech startups as well as billion dollar corporations. The students will give oral and written reports throughout the course as they move through design phases. A final project report and class presentation will allow the students to synthesize their new knowledge from the course into demonstrative routes to commercialization and production of their designs.