

MEC 440-441 Mechanical Engineering Design I & II

(Fall 2018 and Spring 2019)

Document Date: January 19, 2019

Contact Information and Times For MEC 440 Fall 2018

Instructors:

Professor Jahangir Rastegar

Section 02

Fall Classroom: Earth & Space 131

Mon & Wed 8:30 AM– 9:50 AM

Office: 108 Heavy Engineering

Office Hours: MW 10:00 AM–12:00

Noon

631-632-8314

Jahangir.Rastegar@stonybrook.edu

Professor Jay Mendelson

Section 01

Fall Classroom: Melville Library

W4550

Mon & Wed 8:30AM – 9:50AM

Office: 171 Light Engineering

Office Hours: Mon & Wed 10:15AM

- noon

Jay.Mendelson@stonybrook.edu

Mr. Rafael Tejada

Office: 139 Light Engineering

rafael.tejada@stonybrook.edu

Machine shop contact:

Mr. Joseph Schurz

Office: B014 Old Engineering

631-632-8384

Contact Information and Times For MEC 441 Spring 2019

Instructors:

Professor Jahangir Rastegar

Section 02

Spring Classroom: Melville Library
W4525

Mon & Wed 8:30 AM– 9:50 AM

Office: 108 Heavy Engineering

Office Hours: M: 10:00 AM–4:00
PM

631-632-8314

Jahangir.Rastegar@stonybrook.edu

Professor Jay Mendelson

Section 01

Spring Classroom: Melville Library
W4550

Mon & Wed 8:30AM – 9:50AM

Office: 171 Light Engineering

Office Hours: Mon:10:15AM – noon
and 1:30PM – 3:30PM

Wed: 10:30AM – 11:30AM and
1:15PM – 4PM

Jay.Mendelson@stonybrook.edu

Mr. Rafael Tejada

Office: 139 Light Engineering

rafael.tejada@stonybrook.edu

Machine shop contact:

Mr. Joseph Schurz

Office: B014 Old Engineering

631-632-8384

	MEC440	MEC441
Prerequisites:	MEC 225, 300, 310, 317, 320, 325; MEC major; U4 standing	MEC440
Co-requisites:	MEC 410 and 411	

Textbook: No textbook is required.

Reference book: Stuart Pugh, *Total Design — Integrated Methods for Successful Product Design*, Addison Wesley, 1991.

Course sequence description

This two-semester capstone design project sequence provides senior mechanical engineering undergraduate students with significant senior design experience to practice knowledge, motivate learning, prepare for their careers, collaborate, develop innovative techniques and serve the community. Students will work in groups, designing and implementing their projects based on the total design methodology.

The design process consists of the following major steps:

- 1) Teaming and project selection
- 2) Market and user needs analysis
- 3) Product design specification (PDS) initialization and updating
- 4) Conceptual design
- 5) Detail design
- 6) Prototyping
- 7) Testing
- 8) Final prototype presentation
- 9) Final project documentation

The design process spans two semesters. The first semester will emphasize design and analysis. Students will go through the major design steps. By the end of the first semester, each team should generate a complete set of design details of the project, which is ready for fabrication. The second semester will emphasize implementation and testing. Students will fabricate and refine their prototypes, based on testing, to realize proposed functions.

To fulfill the course requirement, each design team needs to submit a project proposal after choosing the project, progress report for each of the above-listed design phases, and a final project report. Moreover, at the end of the first semester, each team needs to give an oral presentation of their design steps and results; and at the end of the second semester, each team needs to give an oral presentation of their design and implementation process, and demonstrate their prototype.

Course topics

1. MEC440
 - 1) Forming design teams
 - 2) Developing design proposals
 - 3) Project management
 - 4) Market and user needs analysis
 - 5) Development of Product Design Specifications
 - 6) Conceptual design
 - 7) Preliminary detail design
 - 8) Writing technical reports
 - 9) Project presentations

2. MEC441
 - 1) Detail design
 - 2) Prototyping
 - 3) Testing
 - 4) Writing technical reports
 - 5) Project presentations and demonstrations
 - 6) Create an e-Portfolio of the project on the Stony Brook web site, powered by Digication
 - 7) Display your project at the URECA campus-wide undergraduate research symposium held each April

Course learning objectives

A. MEC440

- 1) Synthesize engineering knowledge to identify a problem and plan tasks of a mechanical engineering solution to the problem within a team environment.
- 2) Consider market and public welfare issues in PDS as relevant to individuals and the broader society.
- 3) Research current technologies and patents relevant to a design problem.
- 4) Develop PDS in the contexts of economic/political constraints.
- 5) Develop design specifications (PDS) according to identified needs and constraints.
- 6) Generate conceptual designs according to PDS and develop criteria to evaluate designs.
- 7) Evaluate conceptual designs per PDS & developed criteria.
- 8) Accept individual professional responsibility for the project.
- 9) Prepare design reports and give oral presentations with visual materials.

B. MEC441

- 1) Conduct detail design and analysis incorporating engineering standards and manufacturing constraints.
- 2) Identify and acquire new knowledge/information that are required for the project but not taught in classroom.

- 3) Use modern engineering tools to implement the project.
- 4) Gain a better appreciation of how engineering solutions can have impact on the society and people's lives.
- 5) Prepare design reports and give oral presentations with visualized materials.
- 6) Develop an ability to function on a multidisciplinary team.

Team Rules

- 1) The design project should be a team work. ***Each design team should consist of 3-4 people based on the need of the chosen project. No single-person team is allowed. Any team who wish to have a 5 members must obtain explicit approval from the instructors.***
- 2) ***Each team must choose a project advisor from the ME department faculty, and maintain regular meetings with the advisor*** based on a schedule discussed between the team and advisor.
- 3) ***Each team must schedule meetings with the machinist in the detail design phase to deal with manufacturability issues.***

Grading

The letter grade will be issued at the end of the spring semester. The fall and spring semesters will have the same grade. Each team has 100 points. A(100-94), A-(93-90), B+(89-87), B(86-82), B-(81-79), C+(78-76), C(75-72), C-(71-68), D+(67-64), D(63-60), F(59 or below). The following is the breakdown:

1. Reports

MEC 440

- 1) Project Proposal
- 2) Progress report 1 (market/user needs analysis) 10%
- 3) Progress report 2 (conceptual design) 10%
- 4) Progress report 3 (updated market/user needs analysis + updated conceptual design + preliminary detail design) 15%
- 5) Fall Semester Presentation 5%

MEC 441

- 6) Progress report 4 (design review) 10%
- 7) Spring Final Report and Prototype 35%
- 8) Spring Semester Presentation 5%
- 9) Class attendance and team effort (class lectures, presentations and small group meetings) 10%

- In order to get a valid grade, ***a working prototype must be finished*** by the end of the spring semester. If the prototype is not finished, no grade will be given to the team. If your project is under external funding (e.g. by an industrial sponsor), the prototype must meet the project requirements of the sponsor to be considered complete.

- Each report will be submitted and graded on a team basis. ***Late submission of your report will cost 5% of that report per calendar day, and will not be accepted with a delay of 3 or more days.***
- The grade for each student will be adjusted on the basis of his/her team score according to his/her contribution to the project. Team members will have clear delineation of tasks as part of their documentation. Work that is not submitted by assigned deadlines will be reflected in a reduction of the team grade with additional reductions possible for work not completed by an individual team member who was responsible for that phase of the work. ***If any member misses 1/3 of project team activities as documented by their teammates, no grade will be given to him/her. If this happens in the first semester, he/she cannot continue on with MEC441.***
- The semester report (#3) and final report (#5) will be graded by both the class instructor and the project advisor, with the grades of these reports being the average of the two. These grades will be used to calculate your final letter grade. It is your responsibility to make sure that you submit these reports to your instructors and your project advisor by the deadline. You must obtain a project advisor at the start of each semester. It is customary for groups to keep the same project advisor for both fall and spring semesters. If for any reason, your academic advisor cannot continue with you for spring semester, then please see your class professor to be assigned a new one. ***If you do not have a project advisor for either the semester report or final report, you will get a zero grade for the project advisor's portion of the grade.***

Your attendance at class presentations, small group sessions, weekly meetings with your project advisor, and guest lectures is a part of your final grade. ***If you miss 1/3 or more of any of them, you will not be credited for class attendance. This will be done on a per semester basis.***

- Students are expected to clean up after themselves in the senior design lab and machine shop with regards to all parts and tools that they use and in terms of cleaning up waste material. They must also follow all lab and university policies with regards to avoiding the use of food and beverages in laboratories. Students must return all keys to the lab to the mechanical engineering department staff. Confer with Mr. Rafael Tejada for further explanation. Any student in violation of these policies may be subject to discipline ***including reductions in grades.***
- Your attendance and participation at the URECA campus-wide undergraduate research symposium held each April is mandatory. You are expected to help your group prepare a poster and take turns explaining your work to all visitors to your area. ***If you miss the URECA symposium, you will be penalized 3% points will be subtracted from your aggregate score for the class, which translates to roughly 1/3 of a letter grade.***

Project budget and reimbursement policy

- 1) ***The budget limit per student is \$280.***
- 2) The reimbursement of project related purchase covers only materials and components.
- 3) Sales tax cannot be reimbursed.
- 4) Detailed instructions and policy statements are shown in the document “Senior Design Reimbursement Packet 2018-19.pdf”, which will be loaded into Blackboard.
- 5) ***There is additional funding that is available for assistive technology projects, through University and NSF grant funding for these projects.***

Americans with Disabilities Act

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website:

<http://www.stonybrook.edu/ehs/fire/disabilities>

Statement on Academic Dishonesty

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

***Critical Incident Management:** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.*