

DEPARTMENT OF MECHANICAL ENGINEERING
STONY BROOK UNIVERSITY
Design of Machine Elements

COURSE TITLE: MEC410 Design of Machine Elements, Spring 2018 (3 credits)

PREREQUISITES: MEC310, MEC363

BLACKBOARD <http://blackboard.stonybrook.edu>

LECTURE: 5:30 – 6:50 PM, Mon, Wed; Room: Engineering 143

INSTRUCTOR: Jay Mendelson, Professor email: jay.mendelson@stonybrook.edu

OFFICE: Light Engineering 171

OFFICE HOURS: Mon 2:15 – 4:00PM and Wed 1:30-3:30 PM

TA: Guanyu He; Guangyu.He@stonybrook.edu@stonybrook.edu office hours by appointment

Miguel Vazquez; miguel.vazquez@stonybrook.edu office hours by appointment

COURSE OBJECTIVES:

Application of analytical methods, material science, and mechanics to problems in design and analysis of machine components. Includes the design of mechanical components such as belts, chains, gears, shafts, bearings, linear motion elements, springs, fasteners, frames, motors, brakes, and clutches. It takes into consideration factors such as manufacturability and reliability. Design projects with open-ended and interactive problems are assigned to integrate several machine elements in a system.

ASSIGNMENTS: (i) Homework problems are due one week after they are assigned; Solutions will be posted one day after the due date. Late homework will not be accepted. Written reports are expected for all design projects.

TEXT: R. L. Mott, "Machine Elements in Mechanical Design," 6th ed., Pearson, 2018 (ISBN-10: 0-13-4441118-4, ISBN-13: 978-0-13-444118-4)

EXAMINATIONS: 2 Midterms (in class, 80 minutes)

1 Final, to be scheduled during finals week in May 2018

_ All exams are scheduled in class, using a student prepared equation sheet and a calculator

_ NO make-up exams unless arranged prior to the exams and for extenuating circumstances

GRADING: Semester letter grade is based upon performance in the following categories.

Homework assignment 10%

Two Design projects 20%

Two Midterm exams 30%

Final exam 40%

Your attendance is required, and is a part of your final grade. ***If you miss 1/3 or more of the classes, you will be penalized one letter grade on your final grade for the class.***

Course Outline and Assignments:

wk	dates	Subject	Reading	Misc.
1	1/22-1/24	Introduction; Design for Different Types of Loading	ch 5	Course overview
2	1/29-1/31	Belt Drives and Chain Drives	ch 7	
3	2/5-2/7	Kinematics of Gears	ch 8	
4	2/12-2/14	Spur Gear Design	ch 9	
5	2/19-2/21	Helical Gears, Bevel Gears	ch 10 part 1	Midterm #1: 2/19
6	2/26-2/28	Worm Gears, Keys, Couplings, and Seals	ch 11, part 2, ch 11	
7	3/5 - 3/7	Design of Shafts	ch 12	
8	3/12-3/14	Spring Recess		<i>No classes</i>
9	3/19-3/21	Tolerances and Rolling Contact Bearings	ch 13 and 14	
10	3/26 – 3/28	Design of a Power Transmission System and Linear Motion Elements	ch 15 and 17	Design project I (in lieu of homework) due 3/26
11	4/2-4/4	Springs	ch 18	
13	4/9-4/11	Fasteners	ch 19	Midterm #2: 4/9
14	4/16-4/18	Frames and AC Motors	ch 20 and ch 21 part 1	
15	4/23-4/25	DC Motors, Clutches and Brakes Part 1	ch 21 part 2 and 22 part 1	Design project 2 due 4/23
16	4/30 – 5/2	Clutches and Brakes Part 2 and Review for Final	ch 22 part 2	
17	5/7-5/9	Study week		Final Exam: 5/10 8:30AM – 11PM

ABET Student Outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering:
(a3) apply knowledge of science in the analysis of engineering systems;
(a4) apply engineering concepts to devise mechanical engineering solutions in thermal and mechanical systems

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability:

(c1) assess desired needs and multiple realistic constraints in the development of design specifications;

(c2) generate and evaluate design concepts according to a set of specifications;

(c3) design physical systems, components, or processes

(e) An ability to identify, formulate, and solve engineering problems:

(e1) integrate engineering knowledge to recognize problems and identify models of thermal and mechanical systems;

(e2) develop criteria for the evaluation of proposed solutions to engineering problems;

(e3) generate and evaluate possible solutions to engineering problems

(f) An understanding of professional and ethical responsibility:

(f1) know the principles of ethics in engineering;

(f2) consider the ethical implications of an engineering solution

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice:

(k1) utilize engineering standards in design and analysis

The Bachelor of Science (B.S.) degree program of Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

Usage of Blackboard

Students are required to use Blackboard, where important announcements, slides, homework, assignments, and supplementary materials of the course are posted.

<http://blackboard.stonybrook.edu>

Use your NetID and password to login. You can also call the Blackboard Support Team at: 631-632-2777

or

e-mail: blackboard@stonybrook.edu for further information.

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DISABILITY SUPPORT SERVICES (DSS) STATEMENT: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (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 Disability Support Services. For procedures and information go to the following website:

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

ACADEMIC INTEGRITY STATEMENT: 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 are 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/uaa/academicjudiciary/>

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.