

DEPARTMENT OF MECHANICAL ENGINEERING
STONY BROOK UNIVERSITY
Design of Machine Elements

COURSE TITLE: MEC410 Design of Machine Elements, Spring 2019 (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 and Wed 4:00 – 5:00PM

TA: Gurveen Saluja; Gurveen.Saluja@stonybrook.edu office hours by appointment

ASSIGNMENTS: (i) Homework problems are due one week after they are assigned; Homework is to be done in either MS-Excel or Google Sheets software. 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 2019

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

Make-up exams must be arranged prior to the exams. Make-up exam policy is consistent with university policy on:

- (1) Student Participation in University Sponsored Events
http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/participation_univponsored_activities.php
- (2) University policy on Final Exams:
http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/records_registration/final_examinations.php
- (3) New York State Education Law regarding Equivalent Opportunity and Religious Absences
http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/policies_expectations/equivalent_opportunity_religiousabsences.php

GRADING: Semester letter grade is based upon the normal curve for the class, with B defined as the class average. Your aggregate score to determine your location in the curve is based on the following categories:

Homework assignments 10%

Two Design projects 5% each, 10% total
Two Midterm exams 20% each, 40% total
Final exam 40%

Note: Homework and Design projects are done in either MS-Excel or Google Sheets uploaded to Blackboard, with data from these projects entered into the automatic grading system

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.***

ABET Course Learning Objectives¹:

COURSE LEARNING OBJECTIVES								PC	ASSESSMENT TOOLS															
1. Know how to design shafts and axles to prevent mechanical failure under a given load.								2e	Exams, Project															
2. Know how to analyze clutches and brakes in loaded shafts and axles.								2d	Exams, Project															
3. Understand the principles of bolted joints.								1d	Exams															
4. Know how to analyze a joint in bending and shear.								1d	Exams, Project															
5. Understand the concepts of welded joints and permanent joints.								6a	Exams, Project															
6. Know how to design a mechanical spring.								2c, 2d	Exams															
7. Know how to analyze forces associated with a gear or gear trains.								1d	Exams, Project															
8. Know how to size a gear based on bending stress & surface wear.								2d, 2e	Exams, Project															
9. Know how to design belt transmission system.								2d, 2e	Exams															
10. Safety and professional ethics.								5b	Exams															
STUDENT OUTCOME SUPPORT								1	2	3	4	5	6	7										
								2	3			1	1											
								3 – Strongly supported 2 – Supported 1 – Minimally supported																
COURSE TOPICS								<ol style="list-style-type: none"> 1. Introduction to machine design 2. Design of shafts and axles 3. Bolted joints and design of power screws 4. Welded joints, permanent joints 5. Design of springs, fasteners, and frames 6. Rolling contact bearings 7. Design and specification of motors, brakes and clutches 8. Kinematic and force analysis of gears and gear trains 9. Bending stress and surface wear for spur and helical gears 10. Design of flexible mechanical elements 																

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

Tentative Course Outline and Assignments:

wk	dates	Subject	Reading	Misc.
1	1/28-1/30	Introduction; Design for Different Types of Loading	ch 5	Course overview
2	2/4-2/6	Belt Drives and Chain Drives	ch 7	
3	2/11-2/13	Kinematics of Gears	ch 8	
4	2/18-2/20	Spur Gear Design	ch 9	
5	2/25-2/27	Helical Gears, Bevel Gears	ch 10 part 1	Midterm #1: 2/25
6	3/4-3/6	Worm Gears, Keys, Couplings, and Seals	ch 10, part 2, ch 11	
7	3/11 - 3/13	Design of Shafts	ch 12	
8	3/18-3/20	Spring Recess		<i>No classes</i>
9	3/25-3/27	Tolerances and Rolling Contact Bearings	ch 13 and 14	
10	4/1 – 4/3	Design of a Power Transmission System and Linear Motion Elements	ch 15 and 17	Design project I (in lieu of homework) due 4/8
11	4/8-4/10	Springs	ch 18	
13	4/15-4/17	Fasteners	ch 19	Midterm #2: 4/15
14	4/22-4/24	Frames and AC Motors	ch 20 and ch 21 part 1	
15	4/29-5/1	DC Motors, Clutches and Brakes Part 1	ch 21 part 2 and 22 part 1	Design project 2 due 5/6
16	5/6 – 5/8	Clutches and Brakes Part 2 and Review for Final	ch 22 part 2	
17	5/13-5/14	Study days		Final Exam: 5/15 8:30PM – 11PM

Usage of Blackboard

Students are required to use Blackboard, where important announcements, slides, homework, assignments, and supplementary materials of the course are posted. We will be using the automatic grading capability of Blackboard to grade homework and projects. Anti-plagiarism software will be used to guarantee that all students do their own work in accordance to Stonybrook policies as stated in the section below on **ACADEMIC INTEGRITY**.

<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.

Important Copyright Notice: The materials in this course available online through Blackboard or other online channels are for the exclusive use of registered students currently enrolled in this course, and may not be retained or further distributed. In addition to legal sanctions, violation of these copyright prohibitions may result in University disciplinary action.

Various University Policies and Statements

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 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.