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; Guanyu.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.


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:

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

1The 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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Various University Policies and Statements

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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.