MECE 6399-03 Special Topic: Tribology – Fall 2018

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Class Schedule: R 5:55 pm – 8:25 pm, ENGR 1.236
Office Hours: MW 11:00 am – 12:00 pm or by appointment

Textbook


Course Description

Tribology is the science and technology of interacting surfaces in relative motion. As such, this course will cover the areas of friction, wear and lubrication. Specific topics include: surface properties, contact between solid surfaces, adhesion, friction, wear of materials, and fluid film lubrication.

Prerequisites

A grade of ‘C’ or better in MECE 2340 and MECE 4350.

Learning Objectives/Outcomes for the Course

At the conclusion of this course, students will be able to:

1. Apply the basic theories of friction, wear and lubrication to predictions about the frictional behavior of commonly encountered sliding interfaces. (H, Q, T)
2. Be able to identify, analyze, and quantify different types of wear distinguishing between abrasive, adhesive, and fatigue wear. (H, Q, T)
3. Develop an understanding on physical properties of lubricants, explain the different processes of lubrication in all regimes, and the connection with real-world engineering applications. (H, Q, T)
4. Develop an engineering approach to solving real-world engineering application problems that give a feel for engineering practice. (H, Q, T)

Key: H - Homework, Q - Quiz, T – Test
Grading Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework (BlackBoard)</td>
<td>20 %</td>
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<tr>
<td>Class Assignments</td>
<td>10 %</td>
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<tr>
<td>Quizzes (BlackBoard)</td>
<td>10 %</td>
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<tr>
<td>Exams (3 exams, 15% each)</td>
<td>45 %</td>
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<tr>
<td>Final Project</td>
<td>15 %</td>
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<tr>
<td>Final Grade</td>
<td>100 %</td>
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**Grading scale:** A: (90–100), B: (80–89), C: (70–79), D: (60–69), F: (<59)

**Homework**

Homework will be assigned on BlackBoard for every chapter. You must complete your homework on BlackBoard before the due date. **Late homework will not be accepted.** Blackboard assignments should be solved on **engineering paper** following the same format studied in class. In solving the homework assignment, the following four steps should be followed very carefully:

a) Briefly summarize the statement of the problem.

b) Provide a schematic diagram of the problem (if it applies).

c) Solve the problem using your work in detail by stating your assumptions and providing the equations you used and the numerical values you obtained.

d) Highlight answers with **proper units** and discuss your findings.

Failure to follow the four steps mentioned above will result in points deducted from your homework assignment.

**Class Assignments**

Class Assignments will be assigned in class through BlackBoard. You must complete your Assignment on BlackBoard before the end of the class period. No makeup assignments will be given.

**Quizzes**

Quizzes will be assigned on BlackBoard for every chapter. You must complete your Quiz or Quizzes on BlackBoard before the due date. No makeup quizzes will be given.

**Exams**

In general, examinations will consist of theory and problems. They will be written so that the average student can complete them in one hour or so.

**Rules for Examinations**

1. All exams will be closed book and closed notes. A formula sheet and appropriate tables may be provided.
2. **Absolutely no** cell phones, laptops, iPads, iPods, or any other smart technology devices are allowed in exams.
3. No programmable calculators.
4. No calculator covers will be permitted in the exam.
5. Back packs and purses will be stowed against the wall or on the floor in front of your desk.
6. No caps or hats may be worn or placed on the desk.
7. Students may not leave the exam room and return for any reason. Plan your diet/drinks accordingly.
8. Needed paper will be provided. All you need is a pencil, eraser, calculator, and the booklet.
9. Cell phones must be off and in backpack/purse. Anyone receiving a message will have their test collected.
10. Students arriving later than 15 minutes after exam start will be turned away unless they have been delayed by an evening class. The instructor must be notified ahead of time if a late arrival is expected.
11. Make-ups for in-class exams for **documented emergencies** will be scheduled during the last week of class. (Does not apply for Summer courses)

**Attendance**
1. Attendance will be taken every time the class meets. Any student arriving to class 5 minutes after the class has started will not be allowed in class.
2. Students will be allowed a **maximum of three** absences for the whole semester for classes meeting twice a week, **two** absences for classes meeting once a week, and **one** absence for laboratory courses.
3. **One point** will be deducted from the total (100%) for each absence unless documentation justifying that absence is provided. Exceeding the maximum allowable (3 absences), student would be dropped from the class.
4. Students **will not** be permitted to leave the classroom during lectures and exams except for extreme emergencies.

**Calendar of Activities**

The UTRGV academic calendar can be found at [https://my.utrgv.edu/home](https://my.utrgv.edu/home) at the bottom of the screen, prior to login. Some important dates for fall 2018 include:

- **August 27**: First day of classes
- **August 30**: Last day to add a course or register for fall 2018
- **September 3**: Labor Day – NO classes
- **November 14**: Last day to drop a course; will count toward the 6-drop rule
- **November 22 - 24**: Thanksgiving Holiday – NO classes
- **December 6**: Study Day – NO classes
- **December 7 - 13**: Final Exams
- **December 14 – 15**: Commencement Exercises
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Due date for:</th>
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<tbody>
<tr>
<td>1</td>
<td>R Aug 30</td>
<td>Ch 1: Introduction</td>
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<tr>
<td>2</td>
<td>R Sep 06</td>
<td>Ch 2: Solid Surface Characterization</td>
<td>HW Chapter 1</td>
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<tr>
<td>3</td>
<td>R Sep 13</td>
<td>Ch 3: Contact Between Solid Surfaces</td>
<td>HW Chapter 2</td>
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<tr>
<td>4</td>
<td>R Sep 20</td>
<td>Ch 5: Friction</td>
<td>HW Chapter 3</td>
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<td>T Sep 25</td>
<td>Exam 1 ENGR 1.300, 7:00 – 8:30 pm</td>
<td>HW Chapter 5</td>
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<td>5</td>
<td>R Sep 27</td>
<td>Guest Speaker: Dr. Demofilo Maldonado from UDEM, Mexico</td>
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<td>6</td>
<td>R Oct 04</td>
<td>Ch 7: Wear</td>
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<td>7</td>
<td>R Oct 11</td>
<td>Ch 7a: Abrasive Erosive and Cavitation Wear</td>
<td>HW Chapter 7</td>
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<tr>
<td>8</td>
<td>R Oct 18</td>
<td>Ch 7b: Adhesion and Adhesive Wear</td>
<td>HW Chapter 7a</td>
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<tr>
<td>9</td>
<td>R Oct 25</td>
<td>Ch 7c: Fatigue Wear</td>
<td>HW Chapter 7b</td>
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<td></td>
<td>T Oct 30</td>
<td>Exam 2 ENGR 1.300, 7:00 – 8:30 pm</td>
<td>HW Chapter 7c</td>
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<td>10</td>
<td>R Nov 01</td>
<td>Ch 8a: Physical Properties of Lubricants</td>
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<td>11</td>
<td>R Nov 08</td>
<td>Ch 8: Fluid Film Lubrication</td>
<td>HW Chapter 8a</td>
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<td>12</td>
<td>R Nov 15</td>
<td>Ch 9: Boundary Lubrication and Lubricants</td>
<td>HW Chapter 8</td>
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<tr>
<td>13</td>
<td>R Nov 22</td>
<td>Thanksgiving Holiday. No classes</td>
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<tr>
<td>14</td>
<td>R Nov 29</td>
<td>Exam 3 ENGR 1.300, 7:00 – 8:30 pm</td>
<td>HW Chapter 9</td>
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<tr>
<td>15</td>
<td>R Dec 06</td>
<td>Study Day. No classes.</td>
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**Final Exam (Date and Time TBA)**
STUDENTS WITH DISABILITIES:
Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact Student Accessibility Services (SAS) as soon as possible to schedule an appointment to initiate services. Accommodations can be arranged through SAS at any time, but are not retroactive. Students who suffer a broken bone, severe injury or undergo surgery during the semester are eligible for temporary services.

Pregnancy, Pregnancy-related, and Parenting Accommodations
Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting (reasonably immediate postpartum period) are encouraged to contact Student Accessibility Services for additional information and to request accommodations.

Student Accessibility Services:
Brownsville Campus: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at ability@utrgv.edu.
Edinburg Campus: Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at ability@utrgv.edu.

MANDATORY COURSE EVALUATION PERIOD:
Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades. Online evaluations will be available on or about:

Module 1  October 4 – 10
Module 2  November 29 – December 5
Full Fall Semester  November 15 – December 5

ATTENDANCE
Students are expected to attend all scheduled classes and may be dropped from the course for excessive absences. UTRGV’s attendance policy excuses students from attending class if they are participating in officially sponsored university activities, such as athletics; for observance of religious holy days; or for military service. Students should contact the instructor in advance of the excused absence and arrange to make up missed work or examinations.

SCHOLASTIC INTEGRITY:
As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism (including self-plagiarism), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced.
Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

**SEXUAL HARASSMENT, DISCRIMINATION, and VIOLENCE:**
In accordance with UT System regulations, your instructor is a “Responsible Employee” for reporting purposes under Title IX regulations and so must report any instance, occurring during a student’s time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at [www.utrgv.edu/equity](http://www.utrgv.edu/equity), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct and discrimination.

**COURSE DROPS:**
According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the “3-peat rule” and the “6-drop” rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

**STUDENT SERVICES:**
Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Students Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email (ucentral@utrgv.edu) or telephone: (888) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.

Students seeking academic help in their studies can use university resources in addition to an instructor’s office hours. University Resources include the Learning Center, Writing Center, Advising Center and Career Center. The centers provide services such as tutoring, writing help, critical thinking, study skills, degree planning, and student employment. Locations are:

- **Learning center:** BSTUN 2.10 (Brownsville) or ELCTR 100 (Edinburg)
- **Writing center:** BLIBR 3.206 (Brownsville) or ESTAC 3.119 (Edinburg)
- **Advising center:** BMAIN 1.400 (Brownsville) or ESWKH 101 (Edinburg)
- **Career center:** BCRTZ 129 (Brownsville) or ESSBL 2.101 (Edinburg)