ME 556: Lubrication, Friction and Wear  
SPRING 2017

Lecture:  MWF 9:30 - 10:20 a.m. Room: WNG 2579  
Professor: F. Sadeghi  
Office hours: MWF 10:30 - 11:30 a.m.  
Room ME 3003C  
Telephone: (765) 494-5719  
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Text Required for the Course:
Fundamentals of Fluid Film Lubrication – 2nd edition  
Hamrock, Schmid and Jacobson  
Marcel Dekker

Additional References:
Engineering Tribology  
G. W. Stachowiak and A. W. Batchelor  
Elsevier

Principles of Tribology
J. Halling
Macmillan

Grading Policy:
Exams 25%  
Exam 1 in class on 3/22  
Homework 25%  
Projects 50%  
Grade breakdown:  
(A+ – 95 to 100), (A – 90 to 94.9),  
(B+ – 85 to 89.9), (B – 80 to 84.9),  
(C+ – 75 to 79.9), (C – 70 to 74.9),  
(D+ – 65 to 69.9), (D – 60 to 64.9)

Project: The project is an assigned individual work relevant to the course objective. You may need to conduct a literature search in the library on the subject matter. You will need to develop computer models to complete the project assignment. Background in numerical methods (finite difference) is needed for successful completion of the project and the course. You are required to provide a typed, well written document of your findings.

Late Policy: The project and homework handed in after the specified deadlines will receive no credit.

Web Site: Please note various announcements, homework assignments, etc. will be posted on blackboard. Please make sure that you regularly visit blackboard on regular basis for pertinent information. https://mycourses.purdue.edu/
<table>
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<th>Week</th>
<th>Topic</th>
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| 1/9   | Introduction - History of Lubrication, Friction and Wear  
Definition of conformal and non-Conformal Contacts, Regimes of Lubrication |
| 1/16  | **1/16 is Martin Luther King Day, no classes** - Surface Parameters of Interest  
Surface Measurement Techniques (Contacting & non-Contacting) |
| 1/23  | Lubricants, Newtonian, non-Newtonian, Units, Grades, Pressure and Temperature Dependence  
Bearing Materials |
| 1/30  | Viscous Flow, Petrov’s law, Navier Stokes Equation  
Continuity Equation, Viscometry |
| 2/6   | Types of Bearings, Journal, Thrust, Rolling Element, etc., Bearing Materials  
Fundamentals of Lubrication (Reynolds Equation) |
| 2/13  | Physical Significance of Terms in Reynolds Equation  
Hydrodynamic Thrust Bearing (Analytical Solution) |
| 2/20  | Hydrodynamic Thrust Bearing (Analytical Solution)  
Hydrodynamic Thrust Bearing (Numerical Solution)  
Journal Bearing Analytical Solution |
| 2/27  | Short and Long Width Journal Bearing Theory  
Dynamically Loaded Journal Bearing  
Summerfeld Solution |
| 3/6   | Hydrodynamic Squeeze Film Bearing  
Hydrodynamic Squeeze Film Bearing |
| 3/13  | **SPRING BREAK** |
| 3/20  | Lubrication of Non-Conformal Contacts (Hydrodynamic) |
| 3/22  | Midterm exam |
| 3/27  | Hertz Stress Theory & Deformation in Dry Contacts  
Non-Dimensionalization  
Lubrication of Non-Conformal Contacts (Elasto-Hydrodynamic - Line Contacts) |
| 4/3   | Lubrication of Non-Conformal Contacts (Elasto-Hydrodynamic - Point Contacts)  
Lubrication of Non-Conformal Contacts (Elasto-Hydrodynamic - Point Contacts) |
| 4/10  | Lubrication of Non-Conformal Contacts (Elasto-Hydrodynamic - Point Contacts)  
Friction Measurement and Models for Lubricated and Unlubricated contacts  
Wear Measurement Techniques and Equations  
Internal Stresses and Fatigue Damage |
| 4/17  | **Project delivery, presentation and discussions** |