

**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

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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/>

Week	Topic
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 Hertz Stress Theory & Deformation in Dry Contacts
3/27	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