



University of Puerto Rico  
 Mayagüez Campus  
 College of Engineering  
 Department of Mechanical Engineering  
 Bachelor of Science in Mechanical Engineering



### Course Syllabus

<b>1. General Information:</b>	
Alpha-numeric codification: INME 5005 Course Title: Lubrication Number of credits: 3 Contact Period: Three hours of lecture per week	
<b>2. Course Description:</b>	
English: Fundamental principles and concepts of lubrication theory; hydrostatic and hydrodynamic lubrication; examples of journal and thrust bearing design, using both the hydrostatic and hydrodynamic principles; considerations in boundary lubrication.	
Spanish: Estudio de los principios y conceptos fundamentales de la teoría de lubricación; lubricación hidrostática e hidrodinámica; ejemplos de diseño de cojinetes de casquillo y de empuje usando los principios de hidrostática e hidrodinámica; estudio de la capa límite de lubricación.	
<b>3. Pre/Co-requisites and other requirements:</b>	
Prerequisites: Authorization of the Director of the Department	
<b>4. Course Objectives:</b>	
<ul style="list-style-type: none"> <li>● Understanding the relationship between friction, wear and lubrication;</li> <li>● Analyzing frictional losses in mechanical systems;</li> <li>● Explaining wear mechanisms;</li> <li>● Applying quantitative methods to estimate the amount of wear;</li> <li>● Explaining the theories of lubrication and apply them in mechanical systems and processes;</li> <li>● Creating and efficient system using lubricants and coolants that would minimize wear.</li> </ul>	
<b>5. Instructional Strategies:</b>	
<input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input type="checkbox"/> laboratory  <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop  <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring  <input type="checkbox"/> research <input type="checkbox"/> other, please specify:	
<b>6. Minimum or Required Resources Available:</b>	
None	
<b>7. Course time frame and thematic outline</b>	
<b>General Topics</b>	<b>Contact Hours</b>
Fundamental laws of static and dynamic friction	4
Stick-slide friction: Zone models and other concepts	4

Applications of theories and models of friction to mechanical systems	4
Heat arising from friction: cases in machining and forming processes	4
Theories of wear arising from friction	4
Application of friction and wear theories in manufacturing processes and systems	4
Experimental studies: design of experimental apparatus and measuring instruments	4
Analytical studies: theoretical constructs and their numerical/computational analysis	4
Theories of hydrostatic, hydrodynamic and film lubrication	4
Fundamental laws of static and dynamic friction	5
Partial exams	4
<b>Total hours: (equivalent to contact period)</b>	<b>45</b>

### 8. Grading System

Quantifiable (letters)  Not Quantifiable

### 9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2	50
<input checked="" type="checkbox"/> Final Exam	1	25
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	1	25
<input type="checkbox"/> Journals		
<input type="checkbox"/> Other, specify:		
<b>TOTAL:</b>		<b>100%</b>

### 10. Bibliography:

#### Textbook:

Mang, Theo, Bobzin, Kirsten and Thorsten Bartels. 2011. *Industrial Tribology; Tribosystems, Friction, Wear and Surface Engineering, Lubrication*, New Jersey: Wiley-VCH. [Available at the Circulation Collection (TJ1075 .M36 2011), UPRM General Library]

### 11. Law 51: The Comprehensive Educational Services Act for People with Disabilities:

States that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations. For more information, contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

### 12. Academic Integrity

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam

by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.—

**13. Certification 06-43 of the Academic Senate**

"The academic guidelines for offering online courses," defines: Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11 or less are taught via the Internet. According to certification 06-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.

**14. Sexual Harassment: Certification 130-2014-2015 states:**

Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

*Revised: February, 2019*