



## Module (Course Syllabus) Catalogue 2023-2024

<b>College/ Institute</b>	Erbil Technical Engineering College	
<b>Department</b>	Mechanical and Energy Engineering Techniques	
<b>Module Name</b>	Tribology of Machine Elements	
<b>Module Code</b>	TRE201	
<b>Degree</b>	Technical Diploma <input type="checkbox"/>	Bachler <input type="checkbox"/> High Diploma <input type="checkbox"/> Master <input checked="" type="checkbox"/> PhD <input type="checkbox"/>
<b>Semester</b>	Second	
<b>Qualification</b>		
<b>Scientific Title</b>	Assistant Professor	
<b>ECTS (Credits)</b>	6	
<b>Module type</b>	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
<b>Weekly hours</b>	3 hrs	
<b>Weekly hours (Theory)</b>	(3) hrs Class	( ) Total hrs Workload
<b>Weekly hours (Practical)</b>	( ) hr Class	( ) Total hrs Workload
<b>Number of Weeks</b>	15 weeks	
<b>Lecturer (Theory)</b>	Dr. Dlair O. Ramadan	
<b>E-Mail &amp; Mobile NO.</b>	<a href="mailto:Dlair.o.ramadan@epu.edu.iq">Dlair.o.ramadan@epu.edu.iq</a> , 07507574601	
<b>Lecturer (Practical)</b>		
<b>E-Mail &amp; Mobile NO.</b>		
<b>Websites</b>		

# Course Book

<p><b>Course Description</b></p>	<p>This course focuses on basic concepts in tribology. The term 'tribology' is defined as: the science and technology of interacting surfaces in relative motion. By combining lectures and exercises, the course enables students to understand and acquire the fundamentals of tribology which are important for developments of real applications in mechanical engineering.</p>			
<p><b>Course objectives</b></p>	<p>The aim of this module is to provide a broad-based introduction to the interdisciplinary scientific discipline of tribology in engineering fields, including state of art in the information and practical solutions of problems.</p>			
<p><b>Student's obligation</b></p>	<ol style="list-style-type: none"> <li>1. Homework will be assigned periodically. However, homework will neither be collected nor graded.</li> <li>2. Students are responsible to do homework on their own.</li> <li>3. There will be several quizzes during the academic year, not necessarily announced. The quiz contains the materials covered in previous lectures, homework or to be covered that day.</li> <li>4. Attendance and participation in the lecture are mandatory and will be considered in the grading.</li> </ol> <p>Students should bring calculators, rulers, pen and pencils to be used during the lectures.</p>			
<p><b>Required Learning Materials</b></p>	<p>Data show and white board are used throughout the lectures and the lecture notes will be uploaded to the Moodle platform before the lecture day.</p>			
<p><b>Evaluation</b></p>	<p><b>Task</b></p>	<p><b>Weight (Marks)</b></p>	<p><b>Due Week</b></p>	<p><b>Relevant Learning Outcome</b></p>
	<p>Attendance</p>	<p>5%</p>		
	<p>Seminar</p>	<p>10%</p>	<p><b>3<sup>rd</sup> June</b></p>	
	<p>Report</p>	<p>5%</p>	<p><b>27<sup>th</sup> May</b></p>	
	<p>Quiz</p>	<p>10%</p>	<p><b>Every Lecture</b></p>	
	<p>Midterm</p>	<p>20%</p>	<p><b>(5-16) May</b></p>	
	<p>Final</p>	<p>50%</p>	<p><b>(22-30) June</b></p>	
	<p>Total</p>	<p>100%</p>		

<b>Specific learning outcome:</b>	<p>By the end of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand basic aspects of friction and wear.</li> <li>2. Understand and derive governing equations of hydrodynamic lubrication.</li> <li>3. Understand basic aspects of surface roughness and contact mechanics.</li> <li>4. Understand basic aspects of boundary lubrication.</li> <li>5. Understand basic aspects of surface treatment.</li> </ol>	
<b>Course References:</b>	<ol style="list-style-type: none"> <li>1. Course notes</li> <li>2. Engineering Tribology by JA Williams, Oxford University Press.</li> <li>3. Tribology by I Hutchings, Edward Arnold</li> <li>4. Engineering Tribology by Stachowiak &amp; Batchelor, Butterworth-Heinemann</li> <li>5. Lubricant Selection – A R Lansdown, PEP Ltd.</li> </ol>	
<b>Course topics (Theory)</b>	<b>Week</b>	<b>Learning Outcome</b>
Introduction to Tribology - Tribological Failure Analysis	1	Understand the fundamental of tribology such as necessity, history, technical words et al.
Wear Analysis Process	2	Understand the fundamental of wear.
Wear Mechanisms	3	Understand the wear mechanism.
Surface Examination and Characterisation	4	Understand the surface, friction and contact of smooth surfaces.
Contact Mechanics	5	Understand the mechanics of two contact bodies.
Roughness, hardness, friction	6	Understand the surface roughness, hardness and friction.
Wear Testing	7	Understand how to measure the wear in practical
Wear Modelling and Mapping	8	Understand modelling the wear.
Surface Engineering	9	Understand the surface characteristics
Lubrication and Lubricants 1 – Properties of Lubricants	10	Understand properties of lubricants.
Lubrication and Lubricants 2 – Lubrication Regimes	11	Understand boundary lubrication and adsorption
Hydrodynamic Lubrication 1 – Reynold’s Equation	12	Derive Reynolds equation

Hydrodynamic Lubrication 2 – Fluid Wedges & Pad Bearings	13	Understand the hydrodynamic lubrication-fluid wedges.
Hydrodynamic Lubrication 3 – Plain Journal Bearings	14	Understand the hydrodynamic lubrication theory of journal bearings.
Elasto-hydrodynamic Lubrication	15	Understand EHL(elastohydrodynamic lubrication) theory
<b>Practical Topics</b>	<b>Week</b>	<b>Learning Outcome</b>
<b>Questions Example Design</b>		
<b>Extra notes:</b>		
<b>External Evaluator</b>		