This introductory course in tribology (science of friction, lubrication and wear) has specific goals: to present the basic principles of tribology, to develop the attitude to analyse tribological and to illustrate correlations between materials and tribological properties.

Content
BASIC PRINCIPLES Elastic/plastic contacts, friction, lubrication, deformation and fracture in contacts, wear, third body and tribological flow, experimental techniques.
MATERIALS AND CONTACTS Metals and alloys, ceramics, coatings, polymers and composites.
SURFACE CHEMISTRY AND TRIBOLOGY Reaction layers, tribocorrosion, boundary lubricated wear.
APPLICATIONS EXAMPLES Biomedical implants, micro-technology.

Keywords
Wear, friction, lubrication,

Learning Prerequisites
Recommended courses
Introduction à la science des matériaux

Important concepts to start the course
Basics of mechanics (forces, work, energy), Basics of material science (polymers, ceramics, metals)

Learning Outcomes
By the end of the course, the student must be able to:
• Describe tribological systems.
• Describe basic phenomena related to friction, wear and lubrication.
• Link tribological behaviour to material and system parameters.
• Analyze tribological systems in terms of structure and material properties.
• Assess / Evaluate possible relationships between tribological response and involved mechanisms.
• Critique and assess literature published on the subject.
• Work out / Determine possible ways to improve the tribological performance of systems.
• Identify acting main wear mechanisms.

Transversal skills
• Communicate effectively, being understood, including across different languages and cultures.
• Evaluate one's own performance in the team, receive and respond appropriately to feedback.
• Negotiate effectively within the group.
• Summarize an article or a technical report.
• Make an oral presentation.
• Access and evaluate appropriate sources of information.

Teaching methods
Ex cathedra with exercises and case studies
2 presentations by external speakers (in French)

Expected student activities
Participation in the course, resolution of excercises, practical case studies.

Assessment methods
Mid term written exam (50%)
Oral presentation to the other students of the critical analysis of an article published in a tribology journal (in groups).
Questions by students to the presenting group will be evaluated. (50%)

Supervision
Office hours No
Assistants No
Forum No
Others Teacher available for meetings (by prior arrangement through email).

Resources
Bibliography
Book list and general information available at the web site indicated below.

Ressources en bibliothèque
• Analyse et technologie des surfaces: couches minces et tribologie, Traité des matériaux 4 / Mathieu
• Tribology: Friction and Wear of Engineering materials / Hutchings
• Matériaux et contacts : une approche tribologique / Zambelli
• Engineering Tribology / Williams
• Tribology, Principles and Design Applications / Arnell
• Corrosion et chimie de surfaces des métaux / Landolt

Notes/Handbook
Slides copies and general information available on the Moodle site.

Moodle Link
• https://moodle.epfl.ch/course/view.php?id=14726

Prerequisite for
Projects in the field of tribology