PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL AND METALLURGICAL ENGINEERING
ABET COURSE SYLLABI

ICM 2333 DESIGN OF MACHINE ELEMENTS

Credits and contact hours:	10 UC credits / 10 hours (3 hours in lectures and 7 individual work hours per week)
Instructor's name:	Diego Celentano
Course coordinator's name	To be defined
Textbook:	Norton R. Machine design, Prentice Hall, México, 1999.
Course Catalog Description:	Design is an essential task in engineering. Is also a multidisciplinary process, innovative and iterative, that involves various stages during its implementation. Mechanical design is strongly linked to production and processing of energy, and therefore, it requires every discipline of mechanical engineering. This course focuses in analysis and mechanical design of diverse components and machine elements subject to operational loads.
Prerequisite Courses:	ICM2323 Introduction to Mechanical Design
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	1. To set the foundations of mechanical design: stress-strain analysis, mechanical strength of materials and static and dynamic failure criteria. 2. To apply this knowledge to straight and curved mechanical elements, statically determinate and indeterminate structures, shafts, gear trains (straight, helical, conical and endless), clutches and brakes. 3. To analyze the main components of mechanical transmission. 4. To define and apply appropriate design criterion in sizing of mechanical elements. 5. To project complex mechanical assemblies. 6. To work in teams in the development of a design project, to write project reports and present it orally.

Relation of Course to ABET Criteria:

a. Knowledge of mathematics, science and engineering
b. Design and conduct experiments: analyze and interpret data
c. Design a system, component, or process
e. Identify, formulate, and solve engineering problems
f. Professional and ethical responsibility
g. Effective communication
h. Broad education necessary for global, economic, environmental and societal context
j. Knowledge of contemporary issues
k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Static failure criterion: review of analysis of tensions in 3D and equations of strength of materials, application to curve elements.
2. Analysis of deformation and stiffness: static deflection an analysis of statically indeterminate structures through methods of energy. Stiffness properties of elastic systems.
3. Dynamic failure criterion (fatigue): effects of stress concentration, size and finish. Contact forces and contact fatigue. Application to design of shafts.
4. Kinematic considerations of straight, helical, conical and endless gears. Strength durability calculations.
5. Strength analysis and brake and clutch design criterion.

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