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

ICM 2813 CONTROL OF MECHANICAL SYSTEMS

Credits and contact hours:	10 UC credits / 10 hours (3 hours in lectures and 7 individual work hours per week)
Instructor's name:	Luciano Chiang
Course coordinator's name	To be defined
Textbook:	Dorf, R., & Bishop, R.H. Modern Control Systems, 11th Edition. Prentice-Hall, 2007.
Course Catalog Description:	This course provides the fundamental tools for modeling, control and analysis of mechanical systems.
Prerequisite Courses:	ICM2003 Electromechanical Systems
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	1. To obtain the transfer function of a linear mechanical system. 2. To determine the poles (eigenvalues) and zeros of a mechanical lineal system and to understand its physical meaning. 3. To determine the eigenvalues of a mechanical lineal system and to understand its physical meaning. 4. To obtain the steady state response in mechanical lineal system. 5. To obtain the transient response in mechanical lineal system. 6. To characterize the response of a mechanical system through frequency response and standard excitation function response. 7. To understand the feedback signal concept. 8. To modify the behavior of a lineal mechanical system through PID control. 9. To design a feedback system based on an operational amplifier. 10. To design a logical control. 11. To use a data acquisition card. 12. To use a signal output card.
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. Modeling of lineal systems: dynamics of basic components, Laplace transform, transfer function, block diagram.
2. Mechanical system response: impulse response function, steady state response, transient response, first order systems, second order systems.
3. Response in frequency of systems: bandwidth, Bode diagrams, resonance, stability.
4. Systems control: signal feedback, PID control, compensation, simulation.
5. System analysis in state space: movement equations integration, eigenvalues, simulation.
6. Signal acquisition: data acquisition cards, fast Fourier transform analog-digital and digital-analog conversion.