GSiS
Graduate School of Information Sciences.
TOHOKU University

東北大学 大学院情報科学研究科
Graduate School of Information Sciences.TOHOKU University

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Syllabus 2018 Computer and Mathematical Sciences
System Control Science

Japanese

■Basic information

held this year:	yes
instructor(s)	Prof. Kazuhiro Kosuge (Graduate School of Engineering) Prof. Kazuya Yoshida (Graduate School of Engineering) Prof. Koichi Hashimoto Assoc. Prof. Yasuhisa Hirata
room	Mech-2
schedule	The first half year (Wednesday)
begins on:	06/06

■Objectives and outline

Lectures are given in English.

1. Objective
Systems with novel mechanisms are developed in many advanced applications including medical support, welfare, space exploration, and disaster rescue activities. The objective of this lecture is to learn methodologies for designing highly complicated mechanical systems through modern linear and nonlinear control systems.

2. Abstract
First, modern linear control system design methods are reviewed. Numerical examples are given and students are required to solve examples using MATLAB. Next introduction of nonlinear dynamical systems is given and methods for analysis of nonlinear systems, including phase analysis and Lyapnov methods, are presented. Finally nonlinear feedback control designs are described.

3. Goals
Understanding the following topics are shown as goals of this lecture:
- Linear system design and how to use software tools
- Stability of nonlinear dynamical equations
- Phase analysis and Lyapnov methods
- Feedback linearization
- Robust nonlinear control system design

■Class plan

1. Linear system design
State space, Linear quadratic optimal control, Kalman filter
2. Stability of nonlinear dynamical equations
Phase analysis, Equilibrium points, Lyapnov methods, Linearization
3. Feedback linearization
Input-State linearization, Feedback linearization of SISO systems and MIMO systems
4. Robust nonlinear control system design
Passivity, Robot systems, Adaptive systems

■Evaluation

Final exam. Reports and attendance may be considered.

■Textbook(s)

Applied Nonlinear Control, Jean-Jacques E. Slotine and Weiping Li, Prentice-Hall International Press

■Web site

■Office hours

Appointments by email

■ Other information