# Digital Control Theory

2 units (selection)

Yasuhiro Mizutani · Associate Professor / Intelligent Machines, Mechanical Engineering, Intelligent Structures and Mechanics Systems Engineering

**Target**〉 This class introduces the fundamental concept of digital control and neural network that can be used to design the optimal control systems based on the modern control theory.

**Outline**〉 In this lecture the fundamental conception of a digital control system and digital control strategies to apply the modern control theory is presented. In particular, two freedom control and a neural network is explained. The recent topics related to control engineering are also introduced.

**Style**〉 Lecture

***Keyword***〉 ***two freedom control, neural network, optimal control***

**Fundamental Lecture**〉 "**Automatic Control theory 1**"(1.0), "**Automatic Control theory 2**"(1.0)

**Relational Lecture**〉 "**Actuator Control Theory**"(0.5)

**Requirement**〉 Students are required to have a good understanding of undergraduate-level control theory and related subjects.

**Goal**〉

**1.** To understand the outline of the digital control.
**2.** To understand the applications of AI, neural network and fuzzy control

**Schedule**〉

**1.** Outline of digital control system
**2.** Difference of analog and digital control systems
**3.** Mathematical representation of control signal
**4.** Pulse transfer function
**5.** Stability and steady state deviation
**6.** Design of digital control system(PID)
**7.** Design of digital control system(two freedom control)
**8.** Design of digital control system(model prediction)
**9.** Intermediate examination
**10.** Outline of artificial intelligence
**11.** Exercise of artificial intelligence
**12.** Outline of neural network
**13.** Exercise of neural network
**14.** Outline of fuzzy theory
**15.** Exercise of fuzzy theory
**16.** Final examination

**Evaluation Criteria**〉 evaluate based on two examinations and reports.

**Textbook**〉 To be introduced in the class

**Reference**〉 To be introduced in the class

**Contents**〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216774

**Student**〉 Able to be taken by only specified class(es)

**Contact**〉

⇒ Iwata (M427, +81-88-656-9743, iwata@me.tokushima-u.ac.jp) Mail