كلية الرشيد الجامعة
قسم هندسة تقنيات الحاسوب

المرحلة الثالثة

اسس هندسة السيطرة

المحاضرة رقم (١)

مدرس المادة : م.م تميم محمد

CONTROL ENGINEERING FUNDAMENTAL

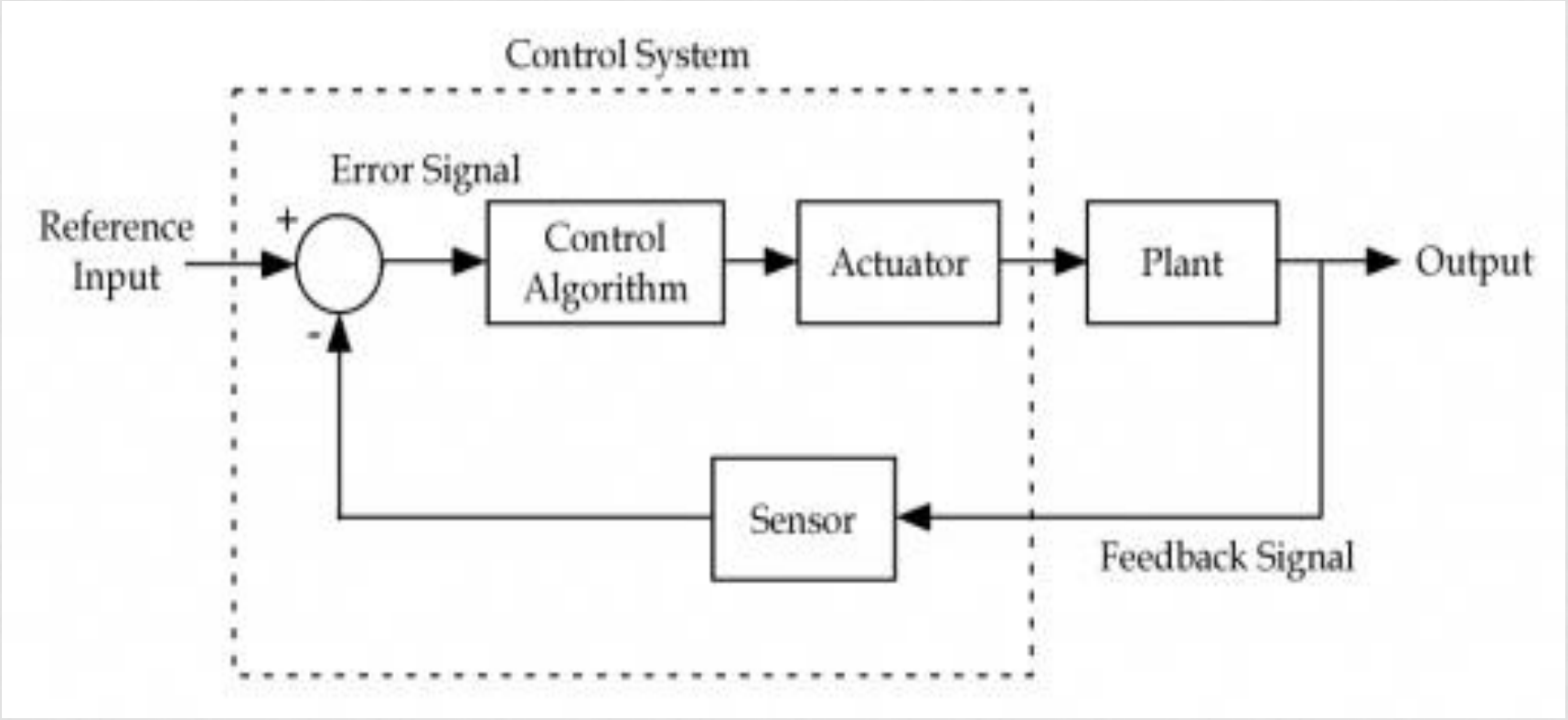
REFERENCE

K. OGATA, 'MODERN CONTROL ENGINEERING', 4TH EDITION, PRENTICE HALL, 2002

Weeks	Syllabus
1st,2nd	Introduction To Control Systems, Open And Closed Loop System.
3rd,4th,5th, 6th	Mathematical modeling of physical systems and Transfer Functions, Mathematical Modeling of D.C. Servo Motor.
7th,8th	Block diagrams.
9th,10th	Time-domain analysis of closed loop control systems and error analysis
11th, 12th	P, PI, PD and PID Modes of Feedback Control, Realization of PID Controller Using Active and Passive Elements.
13th,14th	Stability analysis and Rouths stability Criterion
15th,16th,17th	Root Locus Technique.
18th,19th, 20th	Analysis of control system in frequency domain and Bode Diagrams
21th	Design of control systems and Compensation concepts.
22 th, 23 th,24 th,25 th	Control system design using root locus method.
26 th,27 th,28 th, 29 th	Control system design using Bode Diagrams.
30 th	Definitions of Non Linear Systems.

WHAT IS A CONTROL SYSTEM?

A control system consists of subsystems and a process, assembled for the purpose of controlling the output of the process.



- ***Control.*** Means measuring the value of the controlled variable of the system and applying the manipulated variable to the system to correct or limit deviation of the measured value from a desired value.
- ***Plants.*** A plant may be a piece of equipment, perhaps just a set of machine parts functioning together, the purpose of which is to perform a particular operation.
- ***Processes.*** A process is a natural, progressively continuing operation or development marked by a series of gradual changes that succeed one another in a relatively fixed way and lead toward a particular result.

INTRODUCTION

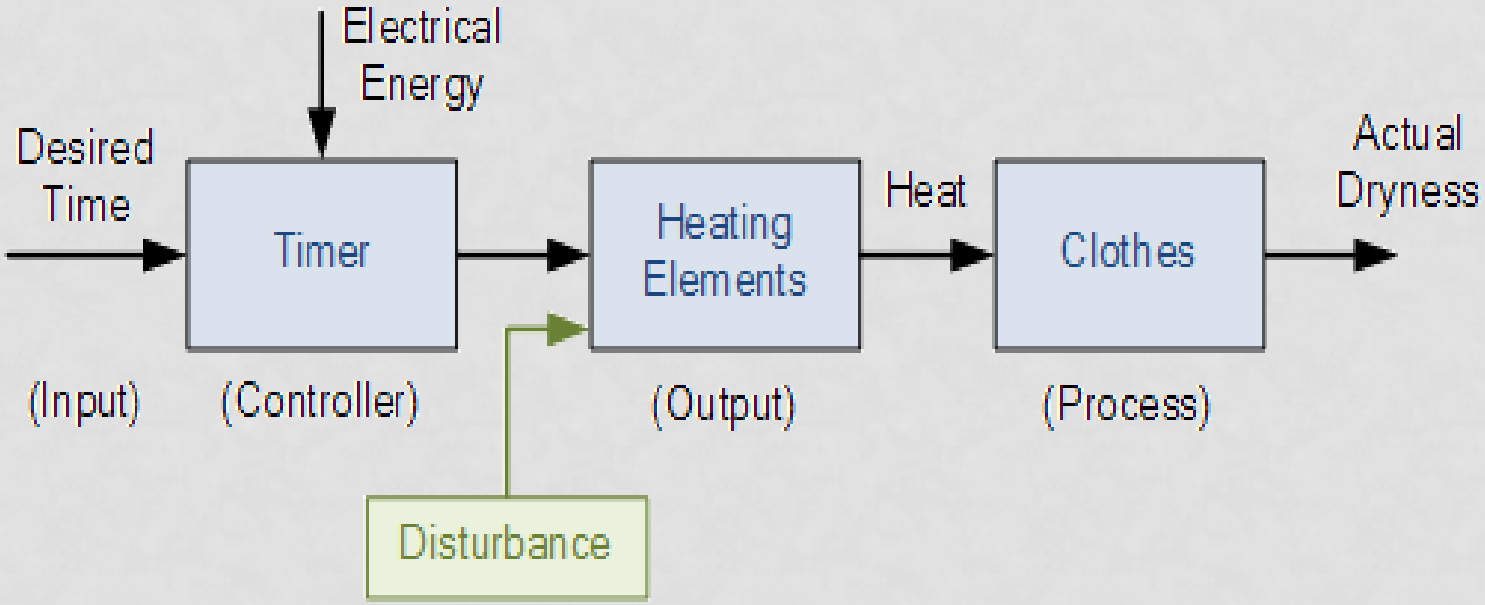
Systems. A system is a combination of components that act together and perform a certain objective. A system is not limited to physical ones.

Feedback Control. Feedback control refers to an operation that, in the presence of disturbances, tends to reduce the difference between the output of a system and some reference input. Here only unpredictable disturbances are so specified, since predictable or known disturbances can always be compensated for within the system

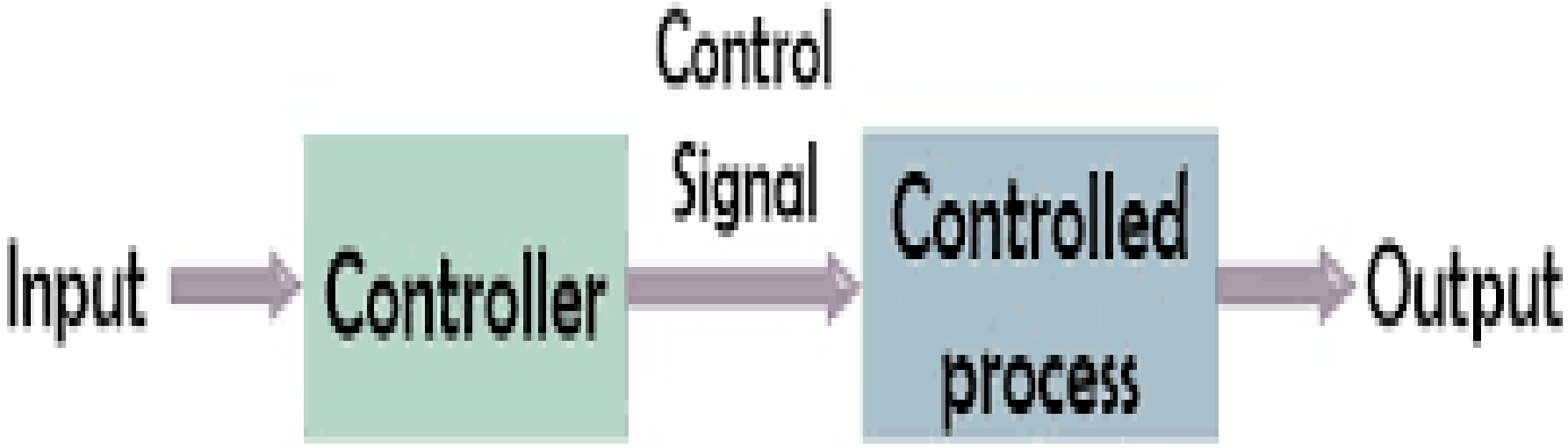
TYPES OF CONTROL SYSTEMS

Open-loop control system (or feed forward control):

The manipulated input variable is generated without measuring the output variable



OPEN LOOP EXAMPLE

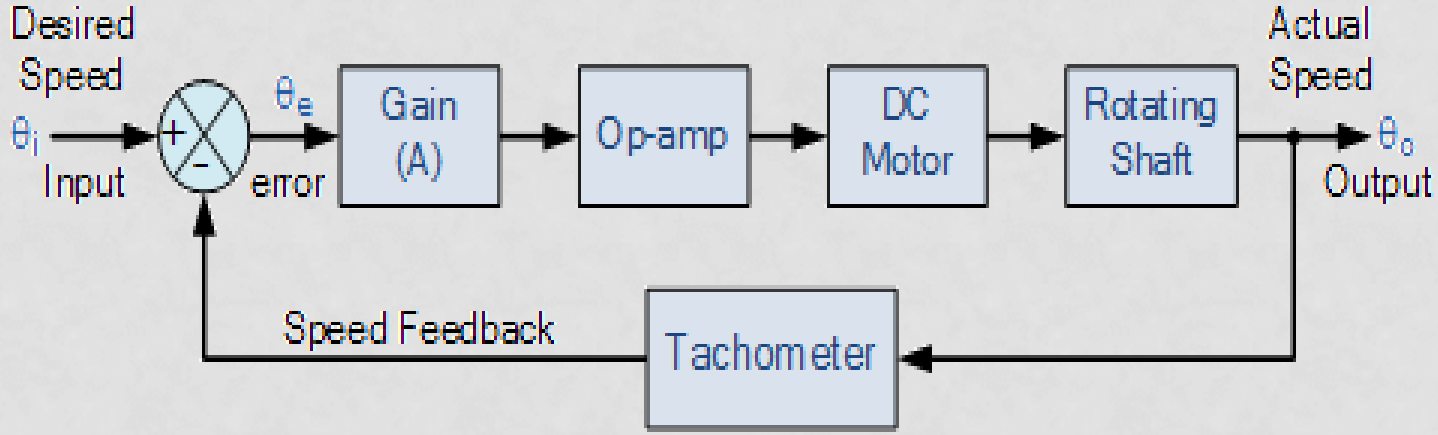


Open Loop Control System

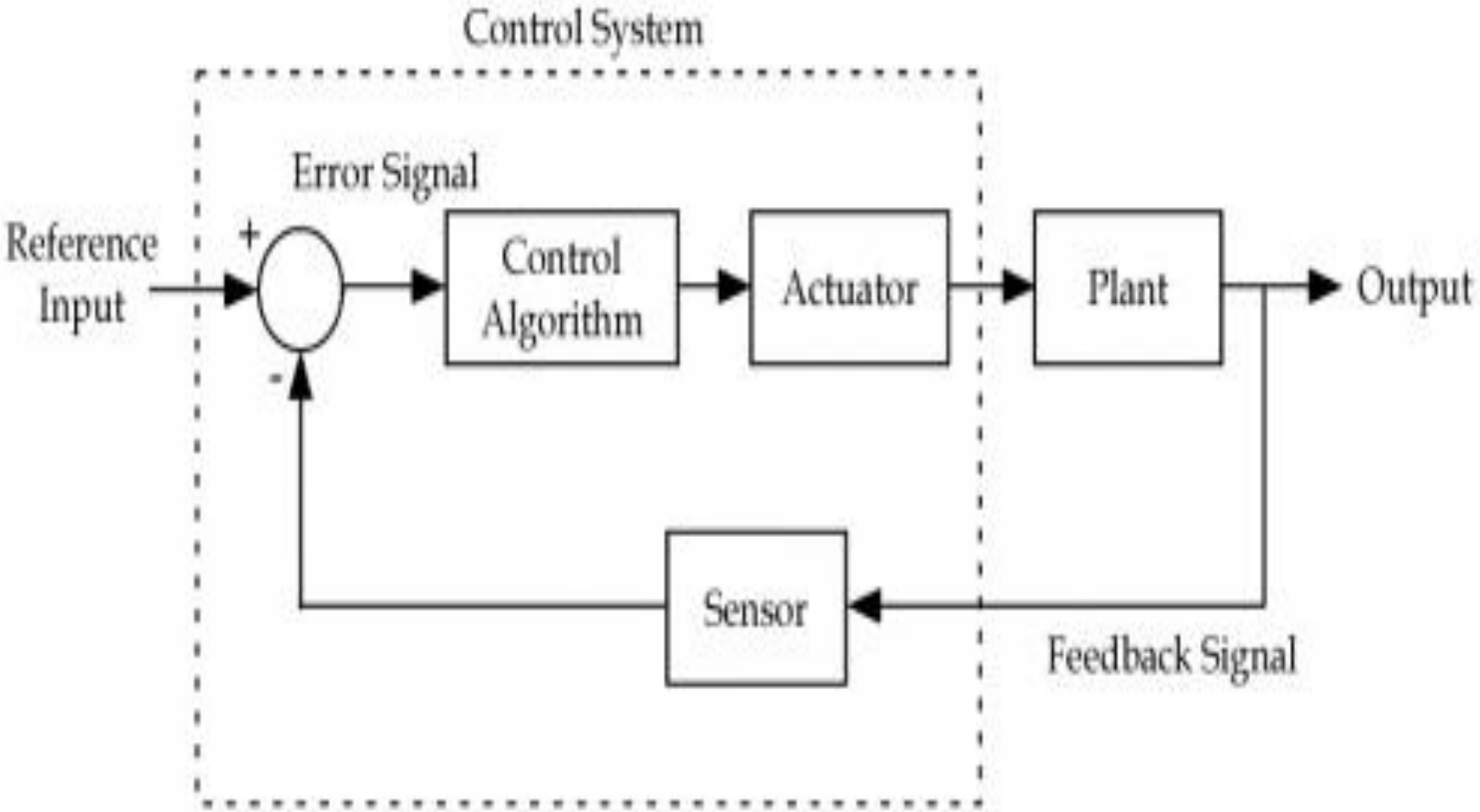
Electronics Coach

TYPES OF CONTROL SYSTEMS

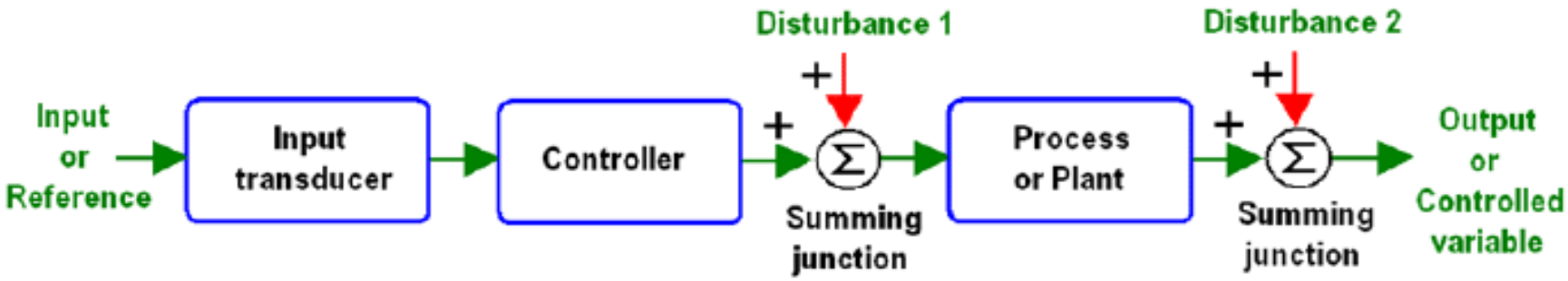
Closed-loop control (feedback control): Measurements of the output variable are feedback to the process through the controller. Closed-loop systems are more complex and expensive than open-loop systems.



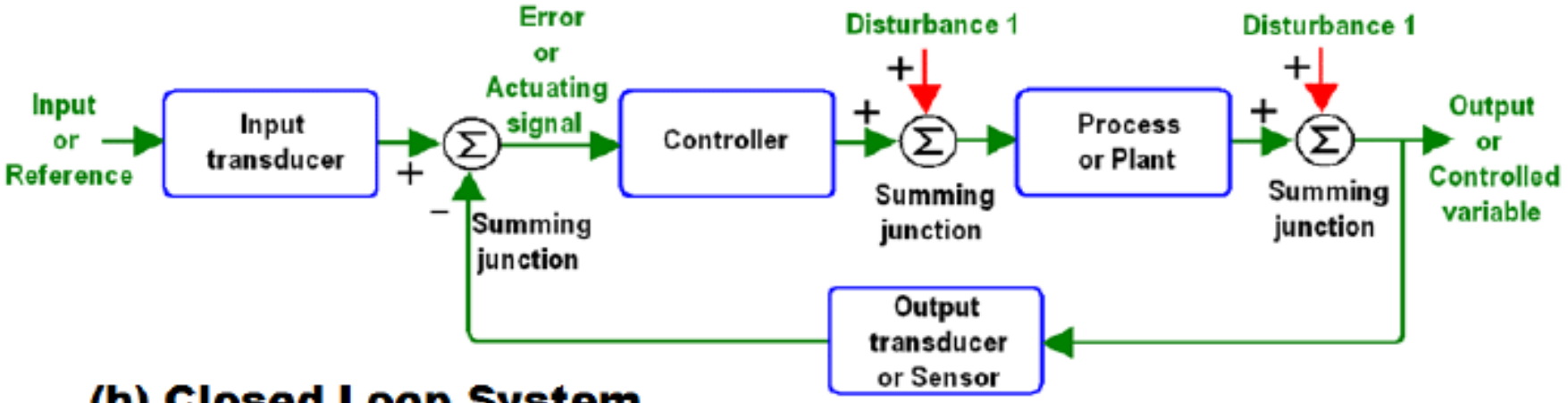
CLOSE LOOP EXAMPLE



CLOSE AND CLOSE LOOP EXAMPLE



(a) Open Loop System



(b) Closed Loop System