



<b>Module Title</b> Control	<b>Module Code</b> MSDE 340	<b>Semester (Sem 1 / Sem 2)</b> Sem 1
<b>Credits</b> 10	<b>Level</b> 5	<b>Professor and email</b> Dongha SHIM dongha@seoultech.ac.kr
<b>Delivery Method</b> Lecture	<b>Delivery Location</b> SeoulTech, Mugung Hall	

### Module Synopsis

This unit covers analysis and design of mechanical control systems. Basic control method in this unit is a classical control method. Main subjects are (1) block diagram modelling of components and systems, (2) time domain, s-domain and frequency domain analysis, (3) control algorithms, (4) root locus method and frequency domain compensator design. As a tool, MATLAB is used for analysis and design of control systems. In the final stage, experiment of position control using DC motor is performed.

### Outline Syllabus

1. Block diagram modeling of components and systems : Mathematical modeling of mechanical and electrical components, Transfer function, Block diagram, Block diagram manipulation.
2. Time domain, s-domain and frequency domain analysis : unit impulse response, unit step response, time domain specification, meaning of pole-zero, relation between time response and pole-zero, bode diagram, gain margin, phase margin, BW, relation between frequency response and time response.
3. Control algorithms: characteristics of P, PI, PD, PID control algorithm.
4. Root locus method and frequency domain compensator design: Control parameter decision by root locus method, compensator design by using frequency domain approach.
5. MATLAB: Throughout the course, MATLAB is used to solve the examples.
6. Experiment: unit of DC motor is used for position control. A pure electronic circuit is provided and students try to control the DC motor and to find out the gain effects of P, PI controls.



### Indicative Reading

1. B. Dorf, Modern Control Systems, 12th Ed., Addison Wesley, 2010, ISBN 0136024580.
2. G. F. Franklin, J. D. Powerll, and A. Emami-Naeini, Feedback Control of Dynamic Systems, 7TH Ed., Prentice Hall, 2014, ISBN 0133496597.
3. N. E. Leonard and W. Levine, Using MATLAB to analyze and design control systems, 2nd Ed., Addison Wesley Longman, 1995, ISBN 0805321934.

NOTIONAL STUDENT WORKLOAD	Hours
MODE OF DELIVERY (FT / PT / DL)	FT
Lectures	40
Seminars	
Tutorials	10
Laboratories/studios/practical	10
Directed learning	
Independent Learning	40
Work experience/fieldwork	
Other: eg formal presentation	
Total Workload 100 hours for a 10 credit module 200 hours for a 20 credit module	100

### Module Outcomes

KU1,2,3	KU1. Demonstrate basic knowledge of the scientific and mathematical foundations of engineering to solve basic problems. KU2. Perform simple analysis of familiar engineering systems. KU3. Identify and utilise basic methodologies to create solutions to specific engineering problems.
IPSA1,4	IPSA1. Demonstrate the use of fundamental approaches to solving readily defined engineering problems. IPSA4. Illustrate solutions to basic engineering problems.
PVA4	PVA4. Apply effective interpersonal and learning skills.



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## MSDE Module Descriptor

<b>Assessments</b>	<b>Assessment Type</b>	<b>Weighting %</b>	<b>Midterm/interim/final</b>
Coursework			
Project			
Quiz			
Test			
Laboratory			
Exam	Final formal examination	100	Final
Presentation			