



# HANYANG UNIVERSITY

## Hanyang International Summer School

Faculty Information	Name	Nyoman B. Karna				
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	Home University	Telkom University				
	Department	Electrical Engineering				
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Course Information	Class No.	18085	Course Code	ISS1125	Credits	3
	Course Name	Microprocessor and IoT				
	Lecture Schedule	Mon-Thu / 13:00~16:00				
	Course Description	This course discusses about how microprocessor works, using x86 and RISC architectures as case studies, followed by its usage on microcontroller (case study: ARM/Atmel). The last 2 classes discuss about future research and enhancement possibilities in microprocessor world including IoT and its supporting technologies.				
	Course Objective	<ul style="list-style-type: none"> <li>- Students should be able to explain how microprocessor works by comparing x86 (case study: i8088) and RISC architecture (case study: ARM Cortex)</li> <li>- Students should be able to design and program microcontroller using ARM Cortex M3</li> <li>- Students should be able to design and program an IoT device using ARM-based Arduino system using emulator (TinkerCAD.com) and send its data to IoT Platform for analytic</li> <li>- Students should be able to explain the future trends of microprocessor technologies</li> </ul>				
	Prerequisite	Understanding on Logic Circuit and C Programming is needed but not mandatory				
	Materials/Textbooks	1. Jacob Millman and Arvin Grabel, "Microelectronics 2 <sup>nd</sup> ed.," McGraw-Hill, 1988 2. John L. Hennessy and David A. Patterson, "Computer Architecture: A Quantitative Approach 4 <sup>th</sup> ed.," Morgan Kaufmann, 2007 William Hohl and Christopher Hinds, "ARM Assembly Language: Fundamentals and Techniques 2 <sup>nd</sup> ed.," CRC Press, 2015				
Evaluation	Attendance	%	Quiz	20 %		
	Assignment	%	Mid-term Exam	20 %		
	Presentation	%	Final Exam	20 %		
	Group Project	40 %	Participation	%		



	Etc.		Evaluation Item	Ratio
				%
				%
Daily Lecture Plan	Week 1	Day 1	Orientation & Opening Ceremony	
		Day 2	Story of Microprocessor and How it Works (Digital Transistor)	
		Day 3	Microprocessor and Memory Interaction (Hardware Perspective)	
		Day 4	Microprocessor and I/O Interaction (Hardware Perspective)	
	Week 2	Day 1	Machine Instruction (case study: CISC-i8088 and RISC-ARM Cortex M3)	
		Day 2	Pipeline in DLX Architecture, Hyper-Threading, Memory Management	
		Day 3	Parallel Processing and Hyper-Threading	
		Day 4	Memory Management (Data Caching)	
	Week 3	Day 1	Midterm exam	
		Day 2	Introduction to Microcontroller (case study: Microchip and ARM)	
		Day 3	Programming Microcontroller (case study: Arduino Uno and Raspberry Pi)	
		Day 4	Designing IoT Device: Sensor Input and Display Output (case study: Arduino Uno)	
	Week 4	Day 1	Connecting to IoT Platform for Analytic, Reporting, and Controlling	
		Day 2	Future Research on Microprocessor	
		Day 3	Best Project Presentation	
		Day 4	Final Exam	