

Syllabus Reference

Course title	Processor Design Laboratory
Credit(s)	2
School sites	Ishikawa
Belong	Information Science courses (Ishikawa)
Course Number	I467
Language used in class	Japanese
Course Term	Term 2-1

Instructor	
Full name	
	* Yasushi Inoguchi
	Kiyofumi Tanaka

Day/Period	Term 2-1 (Mon・1) / Term 2-1 (Wed・2)
Course goals	Students will be able to learn a detailed knowledge of behavior of computer hardware and techniques of constructing it, and to obtain the ability to develop their original computer hardware by actually designing basic digital circuits and processors.
Course content	Students will make basic logic gates using transistors and build combinational and sequential circuits with logic gate ICs on a bread board. Students also experience designing a hardware circuit using schematic and hardware description language (HDL) using EDA tools. Finally, a simple CPU will be produced.
Textbook	Materials will be provided every time
References	None
Related courses	I115 (Digital Logic and Computer Design), I218 (Computer Architecture)
Prerequisites	Students should have fundamental knowledge about I115(Digital Logic and Computer Design) and I218(Computer Architecture). Due to the limitation of the equipment, the number of students is limited for this lecture.
Schedule	<ol style="list-style-type: none"> 1. Basics of transistors and design of logic gates 2. Design of combinational circuits(adder) with bread boards 3. Design of sequential circuits(counter/shift register) with bread boards 4. Structure of FPGA and its design environments 5. Schematic design with EDA tools 6. HDL design with EDA tools 7. Basic processor design 1 (Arithmetic and logical unit) 8. Basic processor design 2 (Program counter, memory access) 9. Basic processor design 3 (Register set, others) 10. Basic processor design 4 (Data path) 11. Basic processor design 5 (Control logic) 12. Building an assembler 13. Operation Verification 14. Advanced techniques
How to prepare for this course	<p>Be well prepared for the course, taking it into consideration that one credit is awarded for 45 study hours including self-study time in addition to that of in total 15-hour lectures.</p> <p>Prepare the basics related to each design unit. A laptop PC is needed. (You can use the Surface provided by Center for Information Science)</p>
Viewpoint of evaluation	Comprehension and proficiency in computer hardware designing.

Grading Method/Criteria	Review of each design unit and operation, and students' presentation at the examination.
Evaluation criteria	Overall evaluation based on functions and performance of the hardware designed and contents of the reports.
Abilities/traits that can be acquired	<ul style="list-style-type: none">• Social competencies: broad interests, logical thinking• Creative abilities: ambition for expertise and skills, ideation• Practical abilities: information gathering, exploratory propulsion, problem definition
Lecture Archive	What to record : Lectures only How to broadcast : Limited (use of key phrase or require advance registration of learner) Note: Since exercises will be given in class, simultaneous face-to-face lectures is necessary. (You cannot take this course in archive only.)

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