

Syllabus Reference

Course title	Computer Architecture (E)
Credit(s)	2
School sites	Ishikawa
Belong	Information Science courses (Ishikawa)
Course Number	I218E
Language used in class	English
Course Term	Term 2-2

Instructor

Full name

* Kiyofumi Tanaka

Day/Period	Term 2-2 (Wed・1) /Term 2-2 (Fri・2)
Course goals	Students study the basic technology for improving performance of modern computers: pipelining, cache memory, and memory hierarchy. In addition, students acquire the fundamentals to construct advanced computers such as superscalar processors and multiprocessors. Students are able to learn the ability and attitude to conduct research computer architecture by gaining deeper knowledge of computer architecture.
Course content	Pipeline technique, cache memory organization, memory hierarchy, branch prediction, fundamentals of superscalar processor, and organization of multiprocessors as bases of high-performance computers.
Textbook	" Computer Organization and Design MIPS Edition: The Hardware/Software Interface" 6th Edition, David A.Patterson and John L.Hennessy, Morgan Kaufmann Pub., 2020. (ISBN 0128201096)
References	None
Related courses	I115 Digital Logic and Computer Design
Prerequisites	Students should have either fundamental knowledge about computer architecture or knowledge of I115 " Digital Logic and Computer Design" .
Schedule	<ol style="list-style-type: none"> 1. Performance vs. Cost (Measures of Performance, Cost Factor) 2. Execution of Instructions 1 (Instruction Set Architecture) 3. Execution of Instructions 2 (Single-cycle Execution) 4. Pipelining 1 (Overview of Pipelining) 5. Pipelining 2 (Pipelined Control) 6. Pipelining 3 (Hazards, Branch Prediction) 7. Pipelining 4 (Superscalar, Dynamic Pipelining) 8. Review of the 1st half and exercise 9. Memory System 1 (Cache memory) 10. Memory System 2 (Performance Analysis and Evaluation of Cache Memory) 11. Memory System 3 (Virtual Memory) 12. Memory System 4 (Memory Hierarchies) 13. Multicores and Parallel Processor 14. Review of the 2nd half and exercise
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>It is important to prepare for the next class by previewing the topics and understanding the meanings of technical terms.</p>
Viewpoint of evaluation	Comprehension of performance, cost, and techniques for performance improvement of computers.

Grading Method/Criteria	Reports, midterm examination, and final examination.
Evaluation criteria	Comprehension based on reports (20%), midterm examination (40%) and final examination (40%).
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 : General (available to watch over internal network anytime)

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