

 國立東華大學
教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	計算機結構			學年/學期 Academic Year/Semester	115/1
課程名稱(英文) Course Name in English	Computer Architecture				
科目代碼 Course Code	CSIEB0160	系級 Department & Year	學三	開課單位 Course-Offering Department	資訊工程學系
修別 Type	學程 Program	學分數/時間 Credit(s)/Hour(s)		3.0/3.0	
授課教師 Instructor	/何宇傑				
先修課程 Prerequisite					
課程描述 Course Description					
This course explores the critical interface between software and hardware. Using RISC-V, the next-generation open-source instruction set architecture (ISA), as a teaching vehicle, this course guides students to deeply understand the component design and underlying operational mechanisms of modern computer systems. The curriculum adopts a progressive, bottom-up framework that seamlessly bridges theory and practice. It begins with the fundamental building blocks—voltages, logic gates, and binary representations—before assembling an Arithmetic Logic Unit (ALU) and a single-cycle processor. To optimize performance, pipelining, cache memory, and branch prediction are then introduced. Once the core CPU architecture is complete, the scope expands outward to input/output (I/O) systems and interrupt mechanisms, ultimately connecting to software compilation, operating system calls, cross-architecture concepts (such as x86), and virtualization technologies. Step by step, students will master the following five core themes of computer systems: 1. How it works: How do computers operate at the foundational level? 2. How to make it fast: How do we make computing faster and smarter? 3. How it interacts (L7-L9): How does it communicate with the outside world? 4. How software uses it: How do our programs and operating systems control the hardware? 5. How the industry builds it: How are CPUs designed in the industry?					
課程目標 Course Objectives					
介紹現代計算機的結構，包括處理器的設計、使執行速度更快的技術、記憶體層次的觀念、輸出/入的組織，以及基本的平行架構。 This course presents the modern design of computer architecture. It covers the important design issues on processor design, techniques for performance improvement, memory hierarchy, I/O organization, and parallel processing.					
系專業能力 Basic Learning Outcomes					課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives
A	資訊專業終身學習能力Ability of lifetime learning in information profession				●
B	實驗驗證資訊科學能力Ability of validate experimental result validation in information science field				○
C	資訊工具整合運用能力Ability of integrated applications of information technology				●
D	資訊系統應用設計開發能力Ability of information application system design and development				○

E	團隊合作溝通協調能力Ability of teamwork, communication, and coordination	●
F	資通訊科技問題解決能力Ability of problem solving regarding information and communication technology	○
G	瞭解資訊科技多元影響能力Ability to understand information technology' s multiple influences	○
H	肩負資訊人社會責任能力Ability of bearing the social responsibilities being among information professionals	

圖示說明Illustration：● 高度相關 Highly correlated ○ 中度相關 Moderately correlated

授課進度表 Teaching Schedule & Content

週次Week	內容 Subject/Topics	備註Remarks
1	Introduction to Computer Architectures & Underlying Logic	
2	Number Representation & Computer Arithmetic	
3	Central Processing Unit (CPU) & Datapath Design	Quiz 1
4	Memory Hierarchy Architecture (I)	
5	Memory Hierarchy Architecture (II)	Quiz 2
6	Pipelined Instruction Execution & Hazards (I)	
7	Pipelined Instruction Execution & Hazards (II)	Quiz 3
8	Branch Prediction & Speculative Execution	
9	Midterm Exam	
10	Input/Output (I/O) & Bus Architectures (I)	
11	Input/Output (I/O) & Bus Architectures (II) MZ_APO Education Kit (Optional)	Quiz 4
12	External Events, Interrupts, and DMA	
13	Parameters Passing and System Calls	Quiz 5
14	x86 Architecture	
15	Microprocessor Architecture Development	Quiz 6
16	Virtual Machines & Virtualization	
17	Final Exam	

彈性 教學 規劃 Flexible Teaching Plan	請勾選(至少需勾選1 個項目): Please tick the box(es). (At least one item is required.):	
	☒	問題討論 Problem-based Discussion
	☐	翻轉教學 Flipped Classroom
	☐	展演實作 Performance / Practical Presentation
	☐	校外參訪 Off-campus Visit
	☐	講座活動 Lecture / Seminar
	☐	線上作業 Online Assignments
	☒	自主學習 Self-directed Learning
	☐	課業輔導 Academic Support
	☐	實驗操作 Experiment Operation
	☐	遠距教學(同步) Distance Learning (Synchronous)
	☐	遠距教學(非同步) Distance Learning (Asynchronous)
	☐	其他(請填寫) Others (Please specify.):
	備註: 本校學期週數自115 學年度起調整為17 週, 為符合1學分18 小時之原則, 請教師規劃安排彈性教學。 Note: From the 115th academic year, the semester will be 17 weeks. Please include flexible teaching activities to meet the required 18 hours per credit.	

教學策略 Teaching Strategies

- ☒ 課堂講授 Lecture
 ☐ 分組討論 Group Discussion
 ☐ 參觀實習 Field Trip
- ☒ 其他 Miscellaneous:

教學創新自評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

- ☐ 問題導向學習(PBL)
 ☐ 團體合作學習(TBL)
 ☐ 解決導向學習(SBL)
- ☐ 翻轉教室 Flipped Classroom
 ☐ 磨課師 Moocs

社會責任(Social Responsibility)

- ☐ 在地實踐 Community Practice
 ☐ 產學合作 Industry-Academia Cooperation

跨域合作(Transdisciplinary Projects)

- ☐ 跨界教學 Transdisciplinary Teaching
 ☐ 跨院系教學 Inter-collegiate Teaching

- ☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

學期成績計算及多元評量方式 Grading & Assessments									
配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)	40%	✓					✓		
期中考成績 Midterm Exam	30%	✓							
期末考成績 Final Exam	30%	✓							
作業成績 Homework and/or Assignments									
其他 Miscellaneous (_____)									
評量方式補充說明 Grading & Assessments Supplemental instructions									
教科書與參考書目(書名、作者、書局、代理商、說明) Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.) 《Computer Organization and Design RISC-V Edition: The Hardware Software Interface》- David A. Patterson and John L. Hennessy. https://github.com/cvut/comparch-slides - Pavel Pisa and Petr Stepan									
課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址) Teaching Aids & Teacher's Website(Including online teaching information. Personal website can be listed here.) https://elearn4.ndhu.edu.tw/moodle/course/view.php?id=16443									
其他補充說明 (Supplemental instructions)									