

National Taiwan Normal University Online Course Teaching Plan

Instructions: According to **Article 6 of the Implementation Regulations Regarding Distance Learning by Universities**, Departments/Programs offering distance learning courses, shall present a course plan and submit it for approval by the university-level academic affairs committee. The course plan referred to in the preceding paragraph shall set forth learning objectives, the target student group, a course outline, teaching methods, interactive student-teacher discussion, grading and course requirements. The course plan shall be posted on the Internet.

1. **Chinese Course Name:** 計算機結構
2. **English Course Name:** Computer Architecture
3. **Course start date:** Spring (Fall, Spring, or Summer) semester of 2023 (yyyy)
4. **Course review submission record**(if applicable):
 - (1) It is a new online course or an existing face-to-face course switching to online course in this semester
 - (2) It is an existing online course; the latest University's Course Committee approval was in the 2nd semester of 109 (academic year)
 - (2.1) The 5-year validity period has expired; a new application is required.
 - (2.2) In case of a major change in the original approved course or if the revision ratio exceeds 30%, reapplication is required.
5. **Basic Course Information** (if applicable)

(1)	Instructor Name & Title	Professor Wen-Chung Kao
(2)	Instructor Sources	<input checked="" type="checkbox"/> Appointed by Departments <input type="checkbox"/> Appointed by General Education Center <input type="checkbox"/> Both of Above <input type="checkbox"/> Others:
(3)	College/Department/Center	College of Technology and Engineering / Department of Electrical Engineering
(4)	School System	<input checked="" type="checkbox"/> Undergraduate Program <input type="checkbox"/> Master's Program <input type="checkbox"/> BA/MA Joint Course <input type="checkbox"/> MA/PhD Joint Course <input type="checkbox"/> PhD Program <input type="checkbox"/> Continuing Education Master's Program
(5)	Program Type	<input checked="" type="checkbox"/> Full-time Program <input type="checkbox"/> Part-time Program <input type="checkbox"/> Others:
(6)	Course Type	<input type="checkbox"/> Common Courses <input type="checkbox"/> General Courses <input type="checkbox"/> School Required Courses <input checked="" type="checkbox"/> Professional Courses <input type="checkbox"/> Educational Courses <input type="checkbox"/> Other:
(7)	Required Courses	<input type="checkbox"/> University-required <input type="checkbox"/> College-required <input type="checkbox"/> Graduate Institute-required <input type="checkbox"/> Department-required <input checked="" type="checkbox"/> Others:
(8)	Course Duration	<input checked="" type="checkbox"/> One Semester (half year) <input type="checkbox"/> Two Semesters (one year) <input type="checkbox"/> Others:
(9)	Required/Elective Course	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/> Others:
(10)	Course Credits	3

(11)	Average of Face-to-Face Teaching Hours Per Week	_1_ hour(s)/week (Divide the total "face-to-face teaching" hours, including the hours of face-to-face teaching and synchronous teaching, by the total number of course weeks.)
(12)	Number of Classes	1
(13)	Estimated Total Number of Students	50
(14)	EMI Courses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
(15)	Type of Cooperation with Domestic/Foreign Universities (omit if inapplicable)	Cooperative University: _____; Department/Institute: _____ <input type="checkbox"/> Partner University <input type="checkbox"/> Dual-Degree Program <input type="checkbox"/> Overseas Special Program <input type="checkbox"/> Others: _____
(16)	Course Platform Website (asynchronous teaching is required)	NTNU online learning platform: https://moodle.ntnu.edu.tw/
(17)	Syllabus Website	http://courseap.itc.ntnu.edu.tw/acadmOpenCourse/index.jsp

6. Course Teaching Design and Implementation Method

(1)	Course Goals	The course aims to provide knowledge on the actual hardware structure inside a computer, CPU design, and software-hardware interfaces. Students who take the course are expected to possess design knowledge of various central processing units and the architecture of new generation graphics processors, both in terms of hardware and software.																								
(2)	Target Student Group	Students from Electrical Engineering, Computer Science, or other related fields who are interested in the software and hardware architecture of computer organization.																								
(3)	Prerequisite(s)	Students who have taken courses in Digital Systems or Logic Design.																								
(4)	Course Content Outline: The followings take 16 weeks per semester for example:																									
	Face-to-Face Teaching		Distance learning																							
			Synchronous	Asynchronous																						
	at least 2 weeks		at least 3 weeks	at least 8 weeks																						
Note: If the online course is offered with cooperative universities, it is not subject to the above teaching hours allocation.																										
<table border="1"> <thead> <tr> <th rowspan="3">Week</th> <th rowspan="3">Topics</th> <th rowspan="3">Learning Objectives (From the perspective of students)</th> <th rowspan="3">Teaching Interactive Design (Multiple choices allowed)</th> <th rowspan="3">Testing/Evaluation Activities (Multiple choices allowed. Choose "None" if not designed for the week.)</th> <th colspan="3">Teaching Method and Hours (fill-in the number of hours, omit if none)</th> </tr> <tr> <th rowspan="2">Face-to-Face Teaching</th> <th colspan="2">Distance learning</th> </tr> <tr> <th>Synchr nous</th> <th colspan="2">Asynchr onous</th> </tr> </thead> <tbody> <tr> <td>E.g.</td> <td>Typhoons and</td> <td>1. Students will realize the</td> <td><input checked="" type="checkbox"/>Topic discussion</td> <td><input type="checkbox"/>Tests</td> <td></td> <td></td> <td>3</td> </tr> </tbody> </table>					Week	Topics	Learning Objectives (From the perspective of students)	Teaching Interactive Design (Multiple choices allowed)	Testing/Evaluation Activities (Multiple choices allowed. Choose "None" if not designed for the week.)	Teaching Method and Hours (fill-in the number of hours, omit if none)			Face-to-Face Teaching	Distance learning		Synchr nous	Asynchr onous		E.g.	Typhoons and	1. Students will realize the	<input checked="" type="checkbox"/> Topic discussion	<input type="checkbox"/> Tests			3
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E.g.	Typhoons and	1. Students will realize the	<input checked="" type="checkbox"/> Topic discussion	<input type="checkbox"/> Tests			3																			

		their precautions	<p>reason why typhoons occur.</p> <p>2. Students will learn about the significant typhoon events.</p> <p>3. Students can explain the precautions against typhoons.</p>	<input type="checkbox"/> Group discussion <input checked="" type="checkbox"/> Peer review <input checked="" type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input checked="" type="checkbox"/> Individual report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			
1	Introduction to Computer Architecture and Technology	Learning objectives and related technologies of this course.	<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input checked="" type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input checked="" type="checkbox"/> Computer Specifications report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			3	
2	Performance Analysis of Computers	Studying various performance evaluation methods and their principles.	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3		
3	Instruction: Machine Language (I)	Review of Digital Systems and Principles of Instruction Design.	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3		
4	Instruction: Machine Language (II)	Compilation of Machine Language and Programming Language.	<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input checked="" type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3		
5	Computer Arithmetic	Addition, Subtraction, and Multiplication Circuits; Floating-Point and Other Special Arithmetic	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____		3		

		Circuits.		<input type="checkbox"/> None			
6	Processor(I)	Data Path Design.	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3	
7	Processor(II)	Control Unit Design.	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3	
8	Processor(III)	Pipelined Design.	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		2	1
9	Midterm Exam		<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input checked="" type="checkbox"/> Midterm exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3	
10	Memory Hierarchy Architectures(I)	Cache Memory	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3	
11	Memory Hierarchy Architectures(II)	Virtual Memory Structure	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3	

	12	Interconnection between Processor and Peripheral Devices	Computer I/O System Design	<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None	3			
	13	Multiprocessors	Multitasking and Parallel Processing Mechanisms	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input checked="" type="checkbox"/> GPU Book report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3		
	14	Instruction-Level Parallelism	Instruction-Level Parallelism Mechanism	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input checked="" type="checkbox"/> Instruction-Level Parallelism Book report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3		
	15	Advanced Computer Arithmetic	Advanced Arithmetic Circuit	<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input checked="" type="checkbox"/> Others: Final Exam Discussion <input type="checkbox"/> None		1	2	
	16	Final Exam		<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input checked="" type="checkbox"/> Final exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None	3			
(5)	Teaching Methods	<p>(<input checked="" type="checkbox"/> if included; multiple choices allowed)</p> <p><input checked="" type="checkbox"/> 1. Provide primary and supplementary materials for online courses</p> <p><input checked="" type="checkbox"/> 2. Provide face-to-face teaching, number: <u>5</u> time(s), total hour(s): <u>15</u> hour(s)</p> <p><input checked="" type="checkbox"/> 3. Provide synchronous teaching, number: <u>2</u> time(s), total hour(s): <u>3</u> hour(s)</p> <p><input checked="" type="checkbox"/> 4. Provide asynchronous teaching, number: <u>10</u> time(s), total hour(s): <u>30</u> hour(s)</p>							

		<input checked="" type="checkbox"/> 5. Provide topic discussion activities <input type="checkbox"/> 6. Provide cooperative learning activities between students <input type="checkbox"/> 7. Mutual learning through students' works <input type="checkbox"/> 8. Others: (please specify)
(6)	Learning Management System (moodle)	Which moodle functions are used in this course? (<input checked="" type="checkbox"/> if included; multiple choices allowed) <input checked="" type="checkbox"/> 1. Personal data <input checked="" type="checkbox"/> 2. Course information <input checked="" type="checkbox"/> 3. Latest News release & browse <input checked="" type="checkbox"/> 4. Course materials viewing & download <input checked="" type="checkbox"/> 5. Grade system management & inquiry (omit if inapplicable) <input type="checkbox"/> 6. Perform online testing (omit if inapplicable) <input type="checkbox"/> 7. Learning information <input checked="" type="checkbox"/> 8. Interactive learning design (chat room or discussion area) <input type="checkbox"/> 9. Other related functions: (please specify)
(7)	Public Information about Interactive Teaching	Instructor Profile and Published Works (webpage link instructions can be attached): https://sites.google.com/view/ntnusoclab/%E9%A6%96%E9%A0%81
		Instructor E-mail: jungkao@ntnu.edu.tw
		Online Office Hours (at least 1 hour per week): AM 9:00 – AM 11:00, Monday.
		Teaching Assistant's Name/E-mail (omit if inapplicable):
		Others(omit if inapplicable):
(8)	Course Material Production	(<input checked="" type="checkbox"/> if included; multiple choices allowed) <input checked="" type="checkbox"/> 1. Provide appropriate reminders of key points <input checked="" type="checkbox"/> 2. Provide teaching-related examples <input checked="" type="checkbox"/> 3. Provide teaching-related exercises and reflective activities <input checked="" type="checkbox"/> 4. Provide supplementary teaching materials or online resources <input checked="" type="checkbox"/> 5. Provide instructions for self-directed learning <input checked="" type="checkbox"/> 6. Learning objectives are consistent with course goals <input type="checkbox"/> 7. Others:
(9)	Assignment Submission	(<input checked="" type="checkbox"/> if included; multiple choices allowed) <input checked="" type="checkbox"/> 1. Provide online assignment content description

	Method	<input checked="" type="checkbox"/> 2. Assignment file upload and download <input type="checkbox"/> 3. Others:
(10)	Assessment	<p>※ To comply with the spirit of online course design, please understand and agree to the contents of the following 3 items, and provide detailed description:</p> <ul style="list-style-type: none"> ■ 1. The course can provide evaluation results and feedback for each learning evaluation ■ 2. The evaluation has taken the students online learning history and participation level into account ■ 3. The percentage of each score is explained in detail below: (Evaluation methods, and their total score percentage) <ul style="list-style-type: none"> (1) Tests: 20% (10%/per time) (2) Assignments and reports: 30% (3) Midterm Exam: 25% (4) Final Exam: 25%
(11)	Precautions for Class:	<ul style="list-style-type: none"> 1. Please make sure to follow the unit schedule and attend the synchronous sessions on time. 2. Please submit the course assignments on time. 3. Please respect the intellectual property rights of the course materials.
(12)		<p><u>Observe intellectual property rights in the creation of course content.</u></p> <p>※ Pay attention to any infringement of copyright or other rights in the creation of relevant teaching content.</p> <p>※ If the copyright for any part of the teaching content is owned by others and authorization has been obtained from the rights holder, please indicate the source of the material.</p>