

# 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 2025 (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 Fall semester of 2020 (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	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	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 checked="" type="checkbox"/> Department-required <input 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)	1. Cooperative University: _____; Department/Institute: _____ Instructor Name: _____; Course Name: _____; Number of Students: _____ 2. <input type="checkbox"/> Partner University <input type="checkbox"/> Dual-Degree Program <input type="checkbox"/> Global Virtual Classroom Course <input type="checkbox"/> Others: _____
(16)	Course Platform Website (asynchronous teaching is required)	NTNU online learning platform: <a href="https://moodle.ntnu.edu.tw/">https://moodle.ntnu.edu.tw/</a>
(17)	Syllabus Website	<a href="http://courseap.itc.ntnu.edu.tw/acadmOpenCourse/index.jsp">http://courseap.itc.ntnu.edu.tw/acadmOpenCourse/index.jsp</a>

## 6. Course Teaching Design and Implementation Method

(1)	Course Goals	Study the practical hardware architecture of computers, design knowledge of CPUs, and software-hardware interfaces. Students taking this course should possess design knowledge of various central processing units (CPUs) and next-generation graphics processors, covering both hardware and software aspects.																
(2)	Target Student Group	Individuals interested in computer organization, encompassing both hardware and software architecture, may consider Electrical Engineering, Computer Science, or related disciplines.																
(3)	Prerequisite(s)	Having previously studied 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><tr><td rowspan="3">Week</td><td rowspan="3">Topics (If there are multiple instructors, please specify instructor names in each week)</td><td rowspan="3">Learning Objectives (From the perspective of students)</td><td rowspan="3">Teaching Interactive Design (Multiple choices allowed)</td><td rowspan="3">Testing/Evaluation Activities (Multiple choices allowed. Choose “None” if not designed for the week.)</td><td colspan="3">Teaching Method and Hours (fill-in the number of hours, omit if none)</td></tr><tr><td rowspan="2">Face-to-Face Teaching</td><td colspan="2">Distance learning</td></tr><tr><td>Synchro nous</td><td>Asynchr onous</td></tr></table>						Week	Topics (If there are multiple instructors, please specify instructor names in each week)	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		Synchro nous
Week	Topics (If there are multiple instructors, please specify instructor names in each week)	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												
						Synchro nous	Asynchr onous											

	1	Introduction	Introduction to Course Learning Objectives and Related Technologies	<input checked="" 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 checked="" type="checkbox"/> <u>Individual</u> report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		3	
	2	Performance & Review of Logic Design	Research on 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 type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input checked="" type="checkbox"/> <u>Individual</u> report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			3
	3	Instruction (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 (II)	Compilation of Machine Language and Programming Language	<input checked="" 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	1	2	
	5	Computer Arithmetic	Arithmetic Circuits for Addition, Subtraction, Floating Point, and Other Specialized Arithmetic Circuits	<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
	6	Processors : (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 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
	7	Processors : (II)	Control Unit Design	<input type="checkbox"/> Topic discussion	<input type="checkbox"/> Tests			3

			<input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			
8	Processors : (III)	Pipelining 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	1	2	
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 type="checkbox"/> midterm exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None	3		
10	Memory Hierarchy (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 (II)	Virtual Memory Architecture	<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	Peripheral Interface In-class test	Computer Input/Output System Design	<input checked="" 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	Multiprocessor	Multiprocessing Parallel Processing	<input type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments			3

			Mechanisms	<input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> _____ exam <input checked="" type="checkbox"/> Individual report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			
	14	Parallel Computing	Instruction-Level Parallelism 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"/> Individual report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			3
	15	Computer Arithmetic	Advanced Arithmetic Circuits	<input checked="" 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 type="checkbox"/> Others: _____ <input checked="" type="checkbox"/> None		3	
	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 type="checkbox"/> Final exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None	3		
(5)	Teaching Methods	( <input checked="" type="checkbox"/> if included; multiple choices allowed) <input checked="" type="checkbox"/> 1. Provide primary and supplementary materials for online courses <input checked="" type="checkbox"/> 2. Provide face-to-face teaching, number: <u>  4  </u> time(s), total hour(s): <u> 10 </u> hour(s) <input checked="" type="checkbox"/> 3. Provide synchronous teaching, number: <u>  4  </u> time(s), total hour(s): <u>  9 </u> hour(s) <input checked="" type="checkbox"/> 4. Provide asynchronous teaching, number: <u> 10 </u> time(s), total hour(s): <u> 29 </u> hour(s) <input type="checkbox"/> 5. Provide topic discussion activities <input checked="" 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) Note: For teachers and students from domestic or foreign universities who are participating in joint programs that require access to Moodle, please have the course instructor contact the platform manager at extensions 5673 or 5579. E-mail: elearn@ntnu.edu.tw						

		<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): <a href="https://sites.google.com/view/ntnusoclab/%E9%A6%96%E9%A0%81">https://sites.google.com/view/ntnusoclab/%E9%A6%96%E9%A0%81</a> 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 Method	( <input checked="" type="checkbox"/> if included; multiple choices allowed) <input checked="" type="checkbox"/> 1. Provide online assignment content description <input checked="" type="checkbox"/> 2. Assignment file upload and download <input type="checkbox"/> 3. Others:
(10)	Assessment	<b>※ 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:</b> <input checked="" type="checkbox"/> 1. The course can provide evaluation results and feedback for each learning evaluation

		<ul style="list-style-type: none"> <li>■ 2. The evaluation has taken the students online learning history and participation level into account</li> <li>■ 3. The percentage of each score is explained in detail below:  (Evaluation methods, and their total score percentage) <ul style="list-style-type: none"> <li>(1) Regular exams twice: 20%</li> <li>(2) Scores for regular homework assignments: 30%</li> <li>(3) Midterm examination: 25%</li> <li>(4) Final examination: 25%</li> </ul> </li> </ul>
(11)	Precautions for Class:	<ul style="list-style-type: none"> <li>1. Please make sure to follow the unit schedule for learning and attend synchronous online sessions on time.</li> <li>1. Submit course practical assignments punctually.</li> <li>2. Respect the intellectual property rights of the course materials.</li> </ul>
(12)	<p><b><u>Observe intellectual property rights in the creation of course content.</u></b></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>	