

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:** 資料通訊
2. **English Course Name:** Data Communication
3. **Course start date:** Fall semester of 2023
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 Spring semester of 2020
 - (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	Chao Wang, Assistant Professor
(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 Science, Department of Computer Science and Information Engineering
(4)	School System	<input type="checkbox"/> Undergraduate Program <input type="checkbox"/> Master's Program <input checked="" 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: elective in the field specified in the departmental policy
(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	_1.25_ 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	35
(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: 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 objectives of this course are for students to learn design principles in data communication, to get some ideas of networking systems analysis, and to have some hands-on experience in systems development.				
(2)	Target Student Group	This course is designed for third-/fourth-year undergraduate students and graduate students.				
(3)	Prerequisite(s)	The students should have some working knowledge in both C and Linux.				
(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.						
	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
						Synchronous
						Asynchronous

1	Course Introduction	To learn an overview of this course	<input checked="" type="checkbox"/> Topic discussion <input checked="" type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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	2.5		
2	Broker-Based Data Communication	To learn a contemporary data communication model, design, and implementation	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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		2.5	
3	The Queueing Model	To have an initial look at the basics of queueing theory	<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 checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None		2.5	
4	Poisson Process and Markov Chain	To explore the fundamental mathematical tools for queueing analysis	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5
5	Queueing Systems (1)	To see how to apply the queueing analysis to examine data communication system performance	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5
6	Queueing Systems (2)	To develop analytical skills in studying data communication system performance	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5

				<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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				2.5
				<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5	
				<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5	
				<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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				2.5
				<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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				2.5
				<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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				2.5

		13	Time Synchronization	To see the standard approaches to synchronize computers over the network	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5	
		14	Communication Error Handling	To learn some fault-tolerant data communication strategies and to see the trade-offs in the design	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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		2.5		
		15	Case Study: LoRa and LoRaWAN	To learn a recent data communication specification in the era of Internet-of-Things	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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			2.5	
		16	Final Exam		<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input checked="" 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		2.5		
(5)	Teaching Methods	<p>(<input checked="" type="checkbox"/> if included; multiple choices allowed)</p> <ul style="list-style-type: none"> <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> 3 </u> time(s), total hour(s): <u> 7.5 </u> hour(s) <input checked="" type="checkbox"/> 3. Provide synchronous teaching, number: <u> 5 </u> time(s), total hour(s): <u> 12.5 </u> hour(s) <input checked="" type="checkbox"/> 4. Provide asynchronous teaching, number: <u> 8 </u> time(s), total hour(s): <u> 20 </u> hour(s) <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)	<p>Which moodle functions are used in this course? (■ if included; multiple choices allowed)</p> <p>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</p> <ul style="list-style-type: none"> <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 checked="" 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	<p>Instructor Profile and Published Works (webpage link instructions can be attached): https://web.ntnu.edu.tw/~cw/authors/cw/</p> <p>Instructor E-mail: cw@ntnu.edu.tw</p> <p>Online Office Hours (at least 1 hour per week): Mondays 2-3PM</p> <p>Teaching Assistant's Name/E-mail (omit if inapplicable): TBD</p> <p>Others(omit if inapplicable):</p>
(8)	Course Material Production	<p>(■ if included; multiple choices allowed)</p> <ul style="list-style-type: none"> <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	<p>(■ if included; multiple choices allowed)</p> <ul style="list-style-type: none"> <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	<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) Moodle Homework Assignments 50% (2) Midterm Exam 15% (in-class written exam) (3) Final Exam 15% (in-class written exam) (4) Online/Offline Participation 20% (including Moodle platform interactions such as the forum discussion)
(11)	Precautions for Class:	This course is designed for third-/fourth-year undergraduate students and graduate students. Students taking this course are assumed to have learned what has been covered in the first two years of study in our department (data structures, algorithms, probability, etc.). We will not repeat those materials in this course.
(12)		<p><u>Observe intellectual property rights in the creation of course content.</u></p> <ul style="list-style-type: none"> ※ Pay attention to any infringement of copyright or other rights in the creation of relevant teaching content. ※ 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.