

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:** 宇宙中的生命與太空環境

2. **English Course Name:** Life in the Universe and the Space Environments

3. **Course start date:** Fall (Fall, Spring, or Summer) semester of 2024 (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	Dr. Yasuhiro Hashimoto
(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	Center for General Education
(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 checked="" type="checkbox"/> General Courses <input type="checkbox"/> School Required Courses <input type="checkbox"/> Professional Courses <input type="checkbox"/> Educational Courses <input type="checkbox"/> Other:
(7)	Required Courses	<input checked="" type="checkbox"/> University-required <input type="checkbox"/> College-required <input type="checkbox"/> Graduate Institute-required <input 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	2

(11)	Average of Face-to-Face Teaching Hours Per Week	0 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	150
(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	Searching for the life in the Universe and investigating the necessary conditions about existence of the life in the Universe is one of the most fundamental and outstanding astronomical questions human can ask. Those questions will not only broaden our knowledge about extraterrestrial world, but more im-portantly, our knowledge about ourselves. The necessary conditions, and therefore the significance and fragility of our existence in the space and time can be only proved by investigating the alien world. To research the life in the Universe will have a deep impact on students’ knowledge and atti-tude towards the future technology and environmental problems on Earth, as well.				
(2)	Target Student Group	Everyone				
(3)	Prerequisite(s)	None				
(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	Learning Objectives (From the perspective of	Teaching	Testing/Evaluation	Teaching Method and Hours (fill-in the number of hours, omit if

		instructors, please specify instructor names in each week)	students)	Interactive Design (Multiple choices allowed)	Activities (Multiple choices allowed. Choose “None” if not designed for the week.)	none)		
						Face-to- Face Teaching	Distance learning	
							Synchro nous	Asynchr onous
1	Introduction		.What is human? What is the life? .What defines the life on Earth? .Bias: Must they be similar to life on Earth? .History of non-Earth life search .Extreme Biology on Earth: Life in hostile environments .Asteroids in Antarctic: Life from Mars?	<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 type="checkbox"/> Others: _____ <input checked="" type="checkbox"/> None	2		
2	Life in the Solar System: Life in the Neighborhood (I)		.Moon .Venus and global warming: Was Venus habitable before? .Mars: Are Martian there ? .Titan: Giant moon around Saturn .Galileo moons around Jupiter -- Salt water ocean? .Jovian atmosphere .Comets and Asteroids: DNA in	<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	2		

			comets? .Interplanetary space					
3	Life in the Solar System: Life in the Neighborhood (II)		<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				2
4	Astrobiology by Space Missions and Probes: Sending Robot Astronomers (I)	.Viking 1 and 2: First little Martian search .Path Finder: First moving robot scientists .Spirit and Opportunity .Phoenix: Landing on the Martian ice .Curiosity Rover: Modern robot biologist .Stardust/Hayabusa : Bringing dusts back to Earth .Voyager I and II: Voyage to outer planets .Galileo: Monitoring Galileo moons .Cassini and Huygens lander: Landing on methane ocean .Future Europa	<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				2

			mission: Submarine in the ocean					
5	Astrobiology by Space Missions and Probes: Sending Robot Astronomers (II)		<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	
6	Human Mission to Mars: Can we send people to Mars?	.Oxygen, Water, Food supply .Current shortest duration plan .Current park-orbit plan	<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			2	
7	Search for Ingredients of Life	.Water, Methane, Oxygen, CO2, and Amino Acids .Sample return mission .Spectroscopic analysis of organic molecules	<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			2	
8	Midterm		<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			2	
9	Exoplanets: Planets around other Suns (I)	.Binary stars and brown dwarfs: Too small Sun. .Hot Jupiters: Easy-to-find planets	<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			2	

			<div>.Habitable Zones: Not too hot, not too cold .Direct method and corona graph: How to see planets, directly? .Eclipsing, transit, and micro lensing: Blinking Sun .Pulsar decay .Radial velocity methods: Watch Sun to move .Gliese system (Gliese 581d): First good candidate .Future experiments: Find small planets around small stars</div>					
10	Exoplanets: Planets around other Suns (II)		<div><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:_____</div>	<div><input type="checkbox"/>Tests <input type="checkbox"/>Assignments <input type="checkbox"/>_____ exam <input type="checkbox"/>_____ report <input type="checkbox"/>Others:_____</div> <div><input checked="" type="checkbox"/>None</div>			2	
11	Technology of Space Travel (Let's go Interstellar space!) (I)	<div>.Early rocket and liquid fuel rocket: Modern rockets .Solid motors: Old technology with new idea .Gravitational assist: How to</div>	<div><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:_____</div>	<div><input type="checkbox"/>Tests <input type="checkbox"/>Assignments <input type="checkbox"/>_____ exam <input type="checkbox"/>_____ report <input type="checkbox"/>Others:_____</div> <div><input checked="" type="checkbox"/>None</div>			2	

			accelerate without gasoline .Atmospheric brake: How to slow down .Ion engine: Weak but long push .Solar sailor: Catching 'solar wind' .Nuclear engine .Special relativity and time delay: Time machine .General relativity, singularity in space-time: Warm hole ?					
12	Technology of Space Travel (Let's go Interstellar space!) (II)		<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				2
13	Long Term Influence from Space Environments: Can human survive in the space?	.Solar wind and Galactic cosmic rays: Risk for Cancer? .Calcium depletion and loss of the muscle .Oxygen, Water, and Food supplies: Need to bring little Earth ? .Mental effects: Home sick in space .Evolutions.. : Can	<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

			life adapt to the space environments					
	14	Probability of Extraterrestrial Life in the Universe: Are really someone there?	.Minkowski space and light cone: The space is too big to communicate? .Drake's equation: Calculate the percentage of life	<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			2
	15	Probing the edge of the solar system and sending message beyond	.Pioneer 10 and 11: First messengers .Voyager I and II: Golden records .New Horizons: Mission beyond Kuiper Belt	<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			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			2
(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>2</u> time(s), total hour(s): <u>4</u> hour(s) <input type="checkbox"/> 3. Provide synchronous teaching, number: _____ time(s), total hour(s): _____ hour(s) <input checked="" type="checkbox"/> 4. Provide asynchronous teaching, number: <u>14</u> time(s), total hour(s): <u>28</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	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						

	System (moodle)	<p>require access to Moodle, please have the course instructor contact the platform manager at extensions 5673 or 5579. E-mail: ellearn@ntnu.edu.tw</p> <p> <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 checked="" 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) </p>
(7)	Public Information about Interactive Teaching	Instructor Profile and Published Works (webpage link instructions can be attached): https://scholar.lib.ntnu.edu.tw/zh/persons/yasuhiro-hashimoto
		Instructor E-mail: hashimot@ntnu.edu.tw
		Online Office Hours (at least 1 hour per week): 12:10-13:10, 15:10-16:10, Wed 16:00-18:00, Thu
		Teaching Assistant's Name/E-mail (omit if inapplicable):
		Others(omit if inapplicable):
(8)	Course Material Production	<p>(<input checked="" type="checkbox"/> if included; multiple choices allowed)</p> <p> <input checked="" type="checkbox"/> 1. Provide appropriate reminders of key points <input type="checkbox"/> 2. Provide teaching-related examples <input type="checkbox"/> 3. Provide teaching-related exercises and reflective activities <input type="checkbox"/> 4. Provide supplementary teaching materials or online resources <input type="checkbox"/> 5. Provide instructions for self-directed learning <input type="checkbox"/> 6. Learning objectives are consistent with course goals <input type="checkbox"/> 7. Others: </p>
(9)	Assignment Submission Method	<p>(<input checked="" type="checkbox"/> if included; multiple choices allowed)</p> <p> <input checked="" type="checkbox"/> 1. Provide online assignment content description <input checked="" type="checkbox"/> 2. Assignment file upload and download <input checked="" type="checkbox"/> 3. Others: Online testing, Grade inquiry </p>

(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> <p>■ 1. The course can provide evaluation results and feedback for each learning evaluation</p> <p>■ 2. The evaluation has taken the students online learning history and participation level into account</p> <p>■ 3. The percentage of each score is explained in detail below: (Evaluation methods, and their total score percentage) (1) Assignments 30 % (2) Midterm Exam 35 % (3) Final exam 35 %</p>
(11)	Precautions for Class:	Scientific thinking and information literacy Active exploration and lifelong learning Innovative leadership and problem solving Social concern and citizenship practice
(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>	