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: 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	Dr. Yasuhiro Hashimoto
(2)	Instructor Sources	■Appointed by Departments □Appointed by General Education Center □Both of Above □Others:
(3)	College/Department/Center	Center for General Education
(4)	School System	■Undergraduate Program □Master's Program □BA/MA Joint Course □MA/PhD Joint Course □PhD Program □Continuing Education Master's Program
(5)	Program Type	■Full-time Program □Part-time Program □Others:
(6)	Course Type	□Common Courses ■General Courses □School Required Courses □Professional Courses □Educational Courses □Other:
(7)	Required Courses	■University-required □College-required □Graduate Institute-required □Department-required □Others:
(8)	Course Duration	■One Semester (half year) □Two Semesters (one year) □Others:
(9)	Required/Elective Course	□Required ■Elective □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	■Yes □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. □Partner University □Dual-Degree Program □Global Virtual Classroom Course □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**	
								Synchronous	**Asynchronous**
		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?	☐Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■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	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None	2		

				comets? .Interplanetary space					
		3	Life in the Solar System: Life in the Neighborhood (II)		■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■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	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			2

				mission: Submarine in the ocean					
		5	Astrobiology by Space Missions and Probes: Sending Robot Astronomers (II)		■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ■Assignments ☐_____ exam ☐_____ report ☐Others:_____ ☐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	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			2
		7	Search for Ingredients of Life	.Water, Methane, Oxygen, CO2, and Amino Acids .Sample return mission .Spectroscopic analysis of organic molecules	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			2
		8	Midterm		☐Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ■Midterm exam ☐_____ report ☐Others:_____ ☐None			2
		9	Exoplanets: Planets around other Suns (I)	.Binary stars and brown dwarfs: Too small Sun. .Hot Jupiters: Easy-to-find planets	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			2

				.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					
		10	Exoplanets: Planets around other Suns (II)		■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			2
		11	Technology of Space Travel (Let's go Interstellar space!) (I)	.Early rocket and liquid fuel rocket: Modern rockets .Solid motors: Old technology with new idea .Gravitational assist: How to	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			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)		■Topic discussion □Group discussion □Peer review □Instructor feedback □Others:_____	□Tests □Assignments □_____ exam □_____ report □Others:_____ ■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	■Topic discussion □Group discussion □Peer review □Instructor feedback □Others:_____	□Tests ■Assignments □_____ exam □_____ report □Others:_____ □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	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■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	■Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ☐_____ exam ☐_____ report ☐Others:_____ ■None			2
		16	Final exam		☐Topic discussion ☐Group discussion ☐Peer review ☐Instructor feedback ☐Others:_____	☐Tests ☐Assignments ■Final exam ☐_____ report ☐Others:_____ ☐None			2
(5)	Teaching Methods	(■ if included; multiple choices allowed) ■ 1. Provide primary and supplementary materials for online courses ■ 2. Provide face-to-face teaching, number: 2 time(s), total hour(s): 4 hour(s) ☐ 3. Provide synchronous teaching, number: ____ time(s), total hour(s): ____ hour(s) ■ 4. Provide asynchronous teaching, number: 14 time(s), total hour(s): 28 hour(s) ■ 5. Provide topic discussion activities ☐ 6. Provide cooperative learning activities between students ☐ 7. Mutual learning through students' works ☐ 8. Others: (please specify)							
(6)	Learning Management	Which moodle functions are used in this course? (■ if included; multiple choices allowed) Note: For teachers and students from domestic or foreign universities who are participating in joint programs that							

	System (moodle)	require access to Moodle, please have the course instructor contact the platform manager at extensions 5673 or 5579. E-mail: elearn@ntnu.edu.tw ■ 1. Personal data ■ 2. Course information ■ 3. Latest News release & browse ■ 4. Course materials viewing & download ■ 5. Grade system management & inquiry (omit if inapplicable) ■ 6. Perform online testing (omit if inapplicable) ■ 7. Learning information ■ 8. Interactive learning design (chat room or discussion area) ☐ 9. Other related functions: (please specify)
(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	(■ if included; multiple choices allowed) ■ 1. Provide appropriate reminders of key points ☐ 2. Provide teaching-related examples ☐ 3. Provide teaching-related exercises and reflective activities ☐ 4. Provide supplementary teaching materials or online resources ☐ 5. Provide instructions for self-directed learning ☐ 6. Learning objectives are consistent with course goals ☐ 7. Others:
(9)	Assignment Submission Method	(■ if included; multiple choices allowed) ■ 1. Provide online assignment content description ■ 2. Assignment file upload and download ■ 3. Others: Online testing, Grade inquiry

(10)	Assessment	※ **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:** ■ 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) (1) Assignments 30 % (2) Midterm Exam 35 % (3) Final exam 35 %
(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)	**<u>Observe intellectual property rights in the creation of course content.</u>** ※ 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.	