

# 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 Space Environments

3. **Course start date:** Spring 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 Fall semester of 2022 (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	橋本康弘 副教授
(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)	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: <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	<p>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.</p> <p>Those questions will not only broaden our knowledge about extraterrestrial world, but more importantly, 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.</p> <p>To research the life in the Universe will have a deep impact on students` knowledge and attitude towards the future technology and environmental problems on Earth, as well.</p>								
(2)	Target Student Group	Everyone								
(3)	Prerequisite(s)	(Required) None								
(4)	Course Content Outline: The followings take 16 weeks per semester for example:	<table border="1" style="width: 100%; text-align: center;"> <tr> <td rowspan="2">Face-to-Face Teaching</td> <td colspan="2">Distance learning</td> </tr> <tr> <td>Synchronous</td> <td>Asynchronous</td> </tr> <tr> <td><b>at least 2 weeks</b></td> <td><b>at least 3 weeks</b></td> <td><b>at least 8 weeks</b></td> </tr> </table> <p>Note: If the online course is offered with cooperative universities, it is not subject to the above teaching hours allocation.</p>	Face-to-Face Teaching	Distance learning		Synchronous	Asynchronous	<b>at least 2 weeks</b>	<b>at least 3 weeks</b>	<b>at least 8 weeks</b>
Face-to-Face Teaching	Distance learning									
	Synchronous	Asynchronous								
<b>at least 2 weeks</b>	<b>at least 3 weeks</b>	<b>at least 8 weeks</b>								

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 their precautions	1. Students will realize the reason why typhoons occur. 2. Students will learn about the significant typhoon events. 3. Students can explain the precautions against typhoons.	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input checked="" 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 checked="" type="checkbox"/> Individual report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None			3
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 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 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 ?	<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 type="checkbox"/> None			2

			<p>.Titan: Giant moon around Saturn</p> <p>.Galileo moons around Jupiter -- Salt water ocean?</p> <p>.Jovian atmosphere</p> <p>.Comets and Asteroids: DNA in comets?</p> <p>.Interplanetary space</p>					
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 type="checkbox"/> None				2
4	Astrobiology by Space Missions and Probes: Sending Robot Astronomers (I)	<p>.Viking 1 and 2: First little Martian search</p> <p>.Path Finder: First moving robot scientists</p> <p>.Spirit and Opportunity</p> <p>.Phoenix: Landing on the Martian ice</p> <p>.Curiosity Rover: Modern robot biologist</p> <p>.Stardust/Hayabusa : Bringing dusts back to Earth</p> <p>.Voyager I and II: Voyage to outer planets</p>	<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 type="checkbox"/> None				2

		<p>.Galileo: Monitoring Galileo moons</p> <p>.Cassini and Huygens lander: Landing on methane ocean</p> <p>.Future Europa mission: Submarine in the ocean</p>					
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 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?	<p>.Oxygen, Water, Food supply</p> <p>.Current shortest duration plan</p> <p>.Current park-orbit plan</p>	<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
7	Search for Ingredients of Life	<p>.Water, Methane, Oxygen, CO<sub>2</sub>, and Amino Acids</p> <p>.Sample return mission</p> <p>.Spectroscopic analysis of organic molecules</p>	<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 type="checkbox"/> None			2
8	Midterm		<input type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input checked="" type="checkbox"/> Midterm exam			2

			<input type="checkbox"/> Instructor feedback <input type="checkbox"/> Others: _____	<input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input type="checkbox"/> None				
9	Exoplanets: Planets around other Suns (I)	<p>.Binary stars and brown dwarfs: Too small Sun.</p> <p>.Hot Jupiters: Easy-to-find planets</p> <p>.Habitable Zones: Not too hot, not too cold</p> <p>.Direct method and corona graph: How to see planets, directly?</p> <p>.Eclipsing, transit, and micro lensing: Blinking Sun</p> <p>.Pulsar decay</p> <p>.Radial velocity methods: Watch Sun to move</p> <p>.Gliese system (Gliese 581d): First good candidate</p> <p>.Future experiments: Find small planets around small stars</p>	<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 type="checkbox"/> None				2
10	Exoplanets: Planets around other Suns (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 type="checkbox"/> None				2

			<p>.Early rocket and liquid fuel rocket: Modern rockets</p> <p>.Solid motors: Old technology with new idea</p> <p>.Gravitational assist: How to accelerate without gasoline</p> <p>.Atmospheric brake: How to slow down</p> <p>.Ion engine: Weak but long push</p> <p>.Solar sailor: Catching 'solar wind'</p> <p>.Nuclear engine</p> <p>.Special relativity and time delay: Time machine</p> <p>.General relativity, singularity in space-time: Warm hole ?</p>	<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 type="checkbox"/> None				2
	11	Technology of Space Travel (Let's go Interstellar space!) (I)		<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 type="checkbox"/> None				2
	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 type="checkbox"/> None				2
	13	Long Term Influence from Space Environments:	<p>.Solar wind and Galactic cosmic rays: Risk for Cancer?</p> <p>.Calcium depletion</p>	<input checked="" type="checkbox"/> Topic discussion <input type="checkbox"/> Group discussion <input type="checkbox"/> Peer review <input type="checkbox"/> Instructor feedback	<input type="checkbox"/> Tests <input type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report				2

		Can human survive in the space?	and loss of the muscle .Oxygen, Water, and Food supplies: Need to bring little Earth ? .Mental effects: Home sick in space .Evolutions.. : Can life adapt to the space environments	<input type="checkbox"/> Others: _____	<input type="checkbox"/> Others: _____ <input type="checkbox"/> None				
	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 checked="" type="checkbox"/> Assignments <input type="checkbox"/> _____ exam <input type="checkbox"/> _____ report <input type="checkbox"/> Others: _____ <input 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 type="checkbox"/> None				2
	16	Final exam		<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 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 type="checkbox"/> 2. Provide face-to-face teaching, number: _____ time(s), total hour(s): _____ 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: 16 time(s), total hour(s): 32 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)	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 type="checkbox"/> 3. Latest News release & browse <input checked="" type="checkbox"/> 4. Course materials viewing & download <input type="checkbox"/> 5. Grade system management & inquiry (omit if inapplicable) <input checked="" type="checkbox"/> 6. Perform online testing (omit if inapplicable) <input type="checkbox"/> 7. Learning information <input 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): 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): 61073007H@gapps.ntnu.edu.tw 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 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 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 <input checked="" type="checkbox"/> 2. The evaluation has taken the students online learning history and participation level into account <input checked="" type="checkbox"/> 3. The percentage of each score is explained in detail below: (Evaluation methods, and their total score percentage) Assignments     30 % Midterm Exam   35 % Final exam      35 %
(11)	Precautions for Class:	
(12)	<u><b>Observe intellectual property rights in the creation of course content.</b></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.	