# 國立成功大學跨領域模組化課程

**開課學年度/學期：113 學年度第 1 學期**　　**領域：科際整合【人、社、自、生】**

## 宜居行星科學及科幻
## Science and Fiction of Habitable Planets

| 授課教師 | 任職單位 | 畢業學校 |
|---|---|---|
| 林俊孚 | Department of Earth and Planetary Sciences<br>美國德州大學奧斯汀分校 | 美國芝加哥大學 |

| 課程類別 | 學分數 | 選必修 | 開課人數 | 其他注意事項 |
|---|---|---|---|---|
| Lecture + Recitation | 1.5 | 選修 | 30 | |

### 先修課程或先備能力

請以修完大二上學期課程學生程度估計。

### 課程難易度

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### 建議修課學生背景

全校各院

### 教學方法

講授 50%，討論 25%，報告 25%

### 評量方式

問題考試 25%：

One-hour written exam about the scientific topics discussed in the lectures. Multiple choice and short answer questions only.

作業 30%：

Writing assignment: one scientific abstract (Nature style; 150 words maximum in English or Chinese) and one fiction synopsis (250 words maximum in English or Chinese)

報告 30%：

Oral presentation of your writing assignments. Answer questions from the lecturer and classmates about your presentation.

出席率 15%：

Including attendance and class participation

### 學習規範

Please study lecture slides and watch assigned movies. Come to class ready to engage in discussions of class materials. Assignments include small group discussion, presentation, and writing an abstract and synopsis.

### 課程概述

本課程旨在利用 Hollywood“科幻”災難電影向學生介紹行星宜居性的熱門話題，這是衡量行星發展和維持適宜生命環境的潛力的指標。最近發現的系外行星重新引起大眾尋找另一個具有類似地球條件宜居行星的好奇心。但在另一方面，Hollywood 電影講述了人類從未見過的巨大災難，觀看起來非常有趣，但卻因誤導行星宜居性的事實而臭名昭著。缺乏現實感讓電影看起來既有趣又吸引人，同

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時卻也造成大眾對行星宜居性如何運作的理解不足。新聞媒體在描述各種科學學科時也經常扭曲事實。

本課程涵蓋行星宜居性的廣泛學科，包括地質學、通訊、媒體、自然災害、氣候系統和全球暖化、自然資源、天文學、生命演化和宇宙的一般探索。利用教科書、電影、報章雜誌、網路專欄文章做為課程教材，學生將了解電影中所描繪的廣泛且具有迫切性主題的宜居條件，學習科學事實（課程正確科學知識與媒體報導科學的事實查核）。透過本課程，學生將同時學習到正確的科學思維與賦有想像力的科幻靈感泉源。

本課程星期二、三、四三天將討論三部電影(”The Martian”、”The core”、”The Day after Tomorrow” 可利用本校圖書館視聽資料)，學生需事先觀看以參與課堂討論。

## 課程概述(英文)

This course aims at using Hollywood “science-fiction” disaster movies to educate students about hot scientific topics in planetary habitability, the measure of a planet’s potential to develop and maintain environments hospitable to life. Recent discoveries of exoplanets have renewed our curiosity of finding another habitable planet with Earth-like conditions. On the other hand, Hollywood movies with colossal disasters human beings have never seen are very entertaining to watch but notorious at getting the facts of planetary habitability wrong. This utter lack of reality makes the movies both entertaining and attractive to the public. However, this also leads to poor public understanding of how the planetary habitability works. All too often the news media also misrepresent the facts in their portrayal of various scientific disciplines.

This course will cover a wide range of disciplines in planet habitability from geology, communication, media, natural hazards, climate system and global warming, natural resources, astronomy, life evolution, and general exploration of the universe. The course materials include textbooks, films, articles, internet blogs, and news media. In this course, students will learn about habitable conditions in a wide range of pressing topics depicted in the movies. We will learn scientific facts (fact checks in lectures and representative media). Students will learn “The Best of Two Worlds” in science and fiction: think about science proficiently and contemplate fiction with imagination.

On Tuesday to Thursday afternoons, we will discuss three movies, “The Martian”, “The Core”, and “The Day After Tomorrow”, respectively. Students can watch them through the university library system. Watch the movies before you come to the class.

## 課程進度

| 日期 | 時間 | 進 度 說 明 |
|---|---|---|
| 07/08(一) | 09:00-12:00 | Introduction and Origin of the Universe: we will discuss the origin of the universe and formation of the solar system and the Earth. |
| | 12:00-13:00 | Lunch time |
| | 13:00-15:30 | Science Fiction of Planetary Habitability:<br>海穹文化李伍薰社長 will teach students about science fiction writing. |
| 07/09(二) | 09:00-12:00 | Solar System and Exoplanet Habitability: we will discuss habitable conditions in the solar system and the discovery of exoplanets where habitable conditions |

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| | | may exist. |
| | 12:00-13:00 | Lunch time |
| | 13:00-15:30 | “The Martian” movie: we will watch the movie and discuss the science and fiction of the conditions on Mars. Martian surface geology indicates existence of water, magnetic fields, and volcanoes in the past. |
| 07/10(三) | 09:00-12:00 | Habitable Earth: we will discuss three major Earth systems, the climate, plate tectonics, and geodynamo systems, and how their interactions lead to habitable environments on Earth. |
| | 12:00-13:00 | Lunch time |
| | 13:00-15:30 | “The core” movie: we will watch the movie and discuss the science and fiction of the conditions in the core where geodynamo, the generation of Earth’s magnetic fields, occurs. Magnetic fields protect Earth’s surface from exposures to harmful high-energy particles. |
| 07/11(四) | 09:00-12:00 | Natural Disasters: we will discuss physical features of natural disasters such as earthquakes, volcanic eruptions, and climate change. These disasters make the Earth unhabitable at times. |
| | 12:00-13:00 | Lunch time |
| | 13:00-15:30 | “The Day after Tomorrow”: we will watch the movie and discuss the science and fiction of the global climate change that leads to the planet unhabitable. Global warming due to burning fossil fuels is a pressing issue facing our society. |
| 07/12(五) | 09:00-12:00 | Are We Alone? We will discuss the possibility of having another habitable planet and the human impacts on planetary habitability. Recent discoveries of exoplanets expand the possibility of finding another habitable planet. |
| | 12:00-13:00 | Lunch time |
| | 13:00-15:30 | Presentation, Discussion, and Exams:<br>(1)1:00-2:00 pm: presentation and discussion of your writing assignments.<br>(2)2:30-3:30 pm: one-hour written exam. Multiple choice and short answer questions from the lecture materials. |

## 課程學習目標

1. Understand the science of planetary habitability in lectures.
2. Fact check fiction in Hollywood Movies.
3. Effective discussion, communication, presentation, and writing of science and fiction.

## 課程的重要性、跨域性與時代性

This course will emphasize on building students’ intellectual interactions by improving their communication and critical thinking skills through oral presentations, writing assignments, and discussions in small-group formats.

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其他備註

參考書目：

How to Build a Habitable Planet: The Story of Earth from the Big Bang to Humankind, Princeton University Press, 2012

本課程若因天災等不可抗力之因素或中央、地方政府公告停課，授課教師需依情況依建議補課方式調整課程進度與補課；若需使用假日、國定假日補課，則需與所有修課學生達成共識方能用例假日補課。

建議補課方式：

1. 線上授課方式補課；
2. 當預期可能會因天災(颱風、超大豪雨...等)宣佈停課時，建議老師先行調整加快課程進度或預先增加可能天氣預警之前幾次課程時數；
3. 停課後隔天起延後下課，補足停課延誤的進度；若停課超過 1 天，則在開始上課後延後下課補課，或當週星期六、日補課；
4. 更改課程授課方式，例如：DEMO 改以考試、報告、作業取代。