

課程綱要與教學進度 (通識中心專用)

110 學年度第 2 學期

課程名稱：(中文) 全球視野下的工程師: 陽明交大-維吉尼亞大學全球化教室				開課單位	通識教育中心
(英文) Engineers, Self, & the Changing Globe: NYCU-UVA Global Classroom				永久課號	新開課程由通識教育中心填寫
授課教師	顧彩璇			英語授課	X 是 <input type="checkbox"/> 否
專兼任	X 專任教師 <input type="checkbox"/> 兼任教師 <input type="checkbox"/> 系所支援			任職單位	STS
學分數	2	開課年級	1-4	授課形式	(一般課程或遠距課程)
				班級人數	15 人 (50 人為原則)
類別 (向度) 類別和向度只能單選		基本素養 (可多選)		核心能力 (可多選)	
X 核心課程 (X 人文 <input type="checkbox"/> 社會 <input type="checkbox"/> 自然)		<input type="checkbox"/> 社會關懷與尊重生命 <input type="checkbox"/> 品德涵養 <input type="checkbox"/> 民主素養 <input type="checkbox"/> 人文藝術陶冶 <input type="checkbox"/> 資訊素養		X 獨立思考與創新 <input type="checkbox"/> 人文涵養與審美能力 <input type="checkbox"/> 公民素養與道德理性 X 歷史視野與多元思維 X 語文能力與國際觀 X 社會關懷與行動力 <input type="checkbox"/> 領導與團隊合作 <input type="checkbox"/> 邏輯與科學推理	
110 學年之後 新制通識架構類別 類別和向度只能單選		<input type="checkbox"/> 基本素養-批判思考 <input type="checkbox"/> 基本素養-量性推理 <input type="checkbox"/> 基本素養-組織管理 <input type="checkbox"/> 基本素養-生命及品格教育 <input type="checkbox"/> 領域課程-人文與美學 <input type="checkbox"/> 領域課程-個人、社會與文化 <input type="checkbox"/> 領域課程-公民與倫理思考 X 領域課程-社會中的科技與自然			
先修科目或先備能力					
具工程背景且對跨領域，工程與人文與全球化議題有高度興趣者					
英文聽說讀寫流利且具基本溝通寫作能力					
願意與美方同學進行交流與研究協作					
擋修 無					

課程目標與內容概述： 1.請說明本課程之性質；2.請說明課程與通教育精神之關連性（見上列基本素養及核心能力，或備註：通識教育之願景與目標）；3.請說明課程達成強化專業和基本素養、核心能力的方式。

本課程探討全球化語境下工程師的養成，專業認同，社會責任與創新模式。本課程將與維吉尼亞大學工程與社會系合作，以全球化課堂的方式進行，着重培養學生以下能力：

1. 跨人文與工程領域的主動學習 Interdisciplinary and active learning
2. 跨國界與跨文化的思維 Transnational and cross-cultural perspectives
3. 批判性的思考全球與地方的關係 Reflection and critical thinking
4. 跨文化語境下偏見的自覺與反思。Awareness and Reflexivity
5. 跨文化的溝通能力。Cross-cultural communication

這些能力將有助於工程系學生打開國際視野，深入思考未來職業規劃，人生目標與工程師社會責任

Course Description

Engineering programs like to promote innovation in product creation. However, issues about what it means to be an engineer, and how engineers from different cultures identify themselves and their jobs have seldom been addressed. This course aims to provide this missing link, by encouraging students to engage with the following questions: How do you situate yourself and your profession in the changing globe, where new innovations, as well as increasing crises and tensions such as the pandemic, trade/tech wars among countries are rapidly and changing our life? Does any of these impact your career choice, identity and goal of being an engineer? What are the advantages, contributions as well as disadvantages and limitations being an engineer in Taiwan when facing these grand challenges?

Drawing from history of science, STS and global studies, this course will offer a historical and geopolitical account of examining the history and contemporary practice of engineering in US, China and Taiwan. It will be operated under the NYCU-UVA Global Classroom, a global learning platform for students to engage in realtime dialogues with peers from the US, to explore cross cultural and self-directed learning about their engineering education in different regions, professional identity formation, and explore how to be better prepared for future job market and contribute their expertise to the local and global society.

教科書與參考資料 (請註明書名、作者、出版社、出版年等資訊)

請務必填寫，此欄為審查課程之重要依據。

教科書列表：

Leslie, Stuart (1993) *The Cold War and American Science. The Military-Industrial-Academic Complex at MIT and Stanford.* Columbia University Press.

Andreas, Joel (2009) *Rise of the Red Engineers: The Cultural Revolution and the Origins of China's New Class.* Stanford University Press.

中譯本：紅色工程師的崛起：清華大學與中國技術官僚階級的起源。香港中文大學出版

無求常安：鄧啟福口述歷史。交通大學出版社

自製講義或課本之參考書目：

請列出所使用資料，例如出版品、網路資源、影音教材等。無自製講義請省略。

Bruce Sinclair (2008) “The Profession of Engineering in America”, in Pursell, Carroll ed. A Companion to American Technology, p.363-384.

Silicon Valley: How Stanford, science, and war made tech history

<https://www.youtube.com/watch?v=uHzVZ3Uk2TI>

Documentary “American Factory”

<https://www.dramasq.co/play/17310-9-1.html>

The True Grand Challenge for Engineering: Self-Knowledge

<https://issues.org/perspectives-the-true-grand-challenge-for-engineering-self-knowledge/>

Cech, E. (2015). Engineers and Engineeresses? Self-conceptions and the Development of Gendered Professional Identities. Sociological Perspectives, 58(1), 56–77.

Encounter with the Issue of Women in Science and Women Leadership

<https://www.youtube.com/watch?v=XwNNZE8fR5E>

Clelland, Donald. (2015). The Core of the Apple: Degrees of Monopoly and Dark Value in Global Commodity Chains. Journal of World-Systems Research. 20. 82. 10.5195/jwsr.2014.564.

Documentary: 我的詩篇

<https://www.dramasq.co/play/23321-6-1.html>

課程大綱		分配時數				備註
單元主題	內容綱要	講授	示範	習作	其他 ¹	
History of Engineering & Engineers across Cultures	1. The Rise and Professionalization of Engineering in the US 2. The Rise and Professionalization of Engineering in China. 3. Professionalization of Engineering in Post-war Taiwan	50%		Filming engineers' life in Taiwan (HW 1-4)	Discussion 50%	

Engineering & Engineers in the Changing Globe	<ol style="list-style-type: none"> 1. Engineers & innovation under the US-China War 2. Engineers, Land & Agricultural Innovation 	50%			Panel Discussion with invited experts 50%	<p>These two sections will be hosted as synchronic GC joined by UVA students/instructor. Three experts will be invited to participate in the global dialogues:</p> <p>WK6: Mr. Li Ke, Huawei Technologies Co. Ltd</p> <p>WK11: 陽明交大陳一平</p>
Engineers & Self Knowledge	<ol style="list-style-type: none"> 1. Engineers & Gender 2. Life/Death in the Global Value Chain 3. Race and Global Engineering Education in the US 					
Engineers' Creative Writing	<ol style="list-style-type: none"> 1. The Power of Story-telling 2. Writing as a method of connecting self, profession and the world. 	20%	20%	40%	20% time reserved for students to share their writing	The workshop will be facilitated by Scott Ezell, an American poet/multimedia independent scholar
教學要點概述	<p>教學方法：（請務必填寫，此項為課程審查之重要依據。）</p> <p>Departing from traditional lecturing, this course is design as an NYCU-UVA Global Classroom which values ACTIVE LEARNING & GLOBAL OUTREACH, and requires direct participation in both in-class and out-class activities. During the course period, you are expected to actively engage in the dialogues with local engineering communities, as well as global partners from UVA School of Engineering, to explore different historical, philosophical, social and political factors that shape engineering professions and engineers' identity across borders. In addition, you and your international peers will collectively identify new roles and common challenges of future global</p>					

engineers. Four teaching formats will be used to facilitate the course progress:

1. **Synchronized Lecture/Seminar with UVA participants:** There are two online, synchronic GC sections on WK6 and WK11 joined by UVA students/instructor. Three experts will be invited to participate in the global dialogues (See the course outline)
2. **Discord-based realtime dialogue and sharing:** Each student will be paired with a UVA student to form a research team for the term project. A Discord Forum will be created for you to exchange ideas and comments with your partner and with other groups. During WK1-WK9, you will create three video clips (HW1, HW2, HW3) with a written document (HW4) to document and analyze the engineering life in Taiwan, and provide feedback on the videos made by the US peer who is assigned to the same tasks. The purpose of this design is for you to actively communicate and collaborate with engineering students from different cultures and develop a comparative angle to examine your education, professional identity, career paths of pursuing an engineering degree in Taiwan, as well as possibilities and visions of being a global engineer facing the rapidly changing world, job market and technology innovation.
3. **Creative Writing Workshop:** You will work with the workshop instructors to complete a set of critical thinking and self-reflective exercise and discussion to explore engineers' self-knowledge—how your gender, cultural, ethnic, socio-economic backgrounds impact your profession identity, career choice, sense of social responsibility of being an engineer, and what you hope to achieve in engineering and beyond, etc. You will produce a narrative to addresses these questions and incorporate it into the filming project. The workshop will be co-facilitated by the course instructor and the invited creative writer Scott Ezell.
4. **Mandated office hour** at least once during the course period to discuss your term project.

評量方式：（請說明作業、報告、討論或考試的次數和所佔比例。出席不可作為評分標準。請務必填寫，此項為課程之審查重要依據。）

評量形式	勾選	所佔比例	相關說明（如執行方式、質與量要求、次數等）
作業	V	90 %	<p>你為什麼要當工程師?什麼是台灣工程師的特質?什麼是全球化的工程師樣貌? 你將製作一支 15 分鐘短片幫助你的美國夥伴理解你在台灣的工程教育與你眼中面向全球工程師的圖像。研究計劃的繳交分為 6 個作業（各占總分 15%）。每個作業你需要準備一支 5~10 分鐘的短片回應以下問題。並與你的全球夥伴交換短片與評論。</p> <p>Why do you choose to be an engineer? How are engineers depicted? What are the characteristics of a Taiwanese engineer? How are these depictions different from other regions of the world? How do you picture yourself and your profession in the current changing globe? You will develop a term project to address these overarching questions, to help your American partners understand your engineering education and the engineering culture in Taiwan.</p> <p>Production: You will make 3 videos. Each video will be 5-10 minutes that can include recordings, static images, narration, music, and/or overlaid text. What to include will be described in the individual homework assignment instructions.</p>
報告	V		
展演	V		

			<p>Sharing: once you have developed your video share that with your partners and describe our impressions of the American depictions of engineering and what motivates your partners" This will all happen in Discord channels for your team.</p> <p>The project is divided into 6 tasks, each is 15% of total grade).</p> <p>HW1. Personal narrative and commitments: 介紹你自己，你為什麼要選擇交大工學院？你心中的工程師模範或典型？你對未來職業與生活的想像？你對美國及美國工程師的印象？Introduce yourself. Why did you choose the School of Engineering in NYCU? Do you have any engineering role model? How do you envision your future career and life as an engineer? What are your impressions of the engineers in the United States?</p> <p>HW2. Becoming an engineer: 你的工程師訓練與校園生活。哪些元素構成你在交大的工程師的訓練與生活？(餐廳?服裝?實驗室?宿舍?打電動?社團或其他社會活動?) 請用影像捕捉這些活動與空間，幫助你的美國夥伴理解台灣的工程師與工程教育 Portray your engineers training and campus life in NYUC. What components constitute your daily life and practice as an engineer in NYCU—give some concrete description such as the daily schedule; the space you have daily activities such as restaurant, laboratory, classroom, dormitory, gym, etc.; the dress code; the students' societies or social events you join; how engineer students date? What video games/leisure entertainment do you play? Capture the spatial-temporal dimensions of these activities to help your U.S. partners understand engineering life and engineering education in Taiwan</p> <p>HW3 Engineers in the Globe: 你對工程師在全球化語境下的想像與實踐。你認為 21 世紀的工程師有什麼特質?面對什麼樣的挑戰? 需要什麼樣的技能與訓練? 在台灣的教育環境與體制下你面對什麼挑戰與困境?如何克服? How do you envision the role and responsibility of engineers in the global context? What global situations and challenges do you think engineers are facing? What qualities do you think engineers should have in responding to these opportunities/crises? What skills and training are required? Do you personally encounter any difficulties, confusions, advantages or disadvantages in Taiwan's educational environment? How do you overcome them?</p> <p>HW4. Compile your written comments and reflections based upon your and your U.S. partners video project. 評論你的美國夥伴的作品(英文書寫，書面繳交)</p>
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			<p>HW5 Creative Writing: A hand-writing letter “ A Letter to the Future Self”</p> <p>HW6 Integration: Integrate HW1-5 into a 15-20 min short film. You will give an oral presentation to introduce your work and play the video on WK 17 & 18. 整合 HW1-5 為一 15 分鐘短片作為學期作業，每位同學必須在 17-18 周以英文介紹自己的作品並回應觀影評論。</p>
	討論/ 課堂出席	10%	Attendance and active participation is required in both classroom discussion and work/comments exchange with the US partners.

教學資源使用情況和相關配合事項：（如教學網站、校內外配合單位，所需設備或其他軟硬體等事項等）

1. Global educational partner: Dept. Engineering & Society, University of Virginia

2. Required software:

- Two synchronized Webex sections
- Discord online forum for students’ discussion and collaboration
- E-learning platform for uploading course materials and assignment submission
- A teaching website to curate/exhibit students’ term projects from both universities

	排定時間	地 點	連絡方式
師生晤談 (Office Hours)	By appointment	Online or in my Yangming Office (I do not have office in Hsin-chu campus)	https://appoint.ly/s/tk9na/oh

教學進度表

週次	上課日期	課程進度
1	02/16	單元主題 Introduction 授課重點 NYCU-UVA Global Classroom Introduction 閱讀材料或安排事項 Reach out to your global partner

2	02/23	<p>單元主題 Engineering/Engineers in the US (I)</p> <p>授課重點 The Rise and Professionalization of Engineering in the US before WWII</p> <p>閱讀材料或安排事項</p> <p>Bruce Sinclair (2008) “The Profession of Engineering in America”, in Pursell, Carroll ed. A Companion to American Technology, p.363-384.</p>
3	03/02	<p>單元主題 Engineering/Engineers in the US (II)</p> <p>授課重點 WWII and postwar engineering</p> <p>閱讀材料或安排事項</p> <p>Leslie, Stuart (1993) The Cold War and American Science. The Military-Industrial-Academic Complex at MIT and Stanford. Columbia University Press.</p> <p>Silicon Valley: How Stanford, science, and war made tech history https://www.youtube.com/watch?v=uHzVZ3Uk2TI</p> <p>HW1 Due</p>
4	03/09	<p>單元主題 Engineers in China (I)</p> <p>授課重點 The Rise and Professionalization of Engineering in China.</p> <p>閱讀材料或安排事項</p> <p>Andreas, Joel (2009) Rise of the Red Engineers: The Cultural Revolution and the Origins of China’s New Class. Stanford University Press.</p> <p>中譯本: 紅色工程師的崛起: 清華大學與中國技術官僚階級的起源. 香港中文大學出版</p>
5	03/16	<p>單元主題 Engineers in China (II)</p> <p>授課重點 Engineers/Engineering in contemporary China</p> <p>閱讀材料或安排事項</p> <p>Documentary “American Factory” https://www.dramasq.co/play/17310-9-1.html</p> <p>HW2 Due</p>
6	03/23	<p>單元主題 Engineers & innovation under the US-China War (online joined lecture with UVA)</p> <p>授課重點 Guest Speaker: Mr. Li Ke, Huawei Technologies Co. Ltd</p> <p>閱讀材料或安排事項</p> <p>Corporate Culture: the “Nuclear Bomb” of Huawei https://www.linkedin.com/pulse/corporate-culture-nuclear-bomb-huawei-eric-flamholtz/</p>

7	03/30	<p>單元主題 Engineers in Post-war Taiwan (Guest: 交大校史中心周湘雲，鄧啟福口述歷史作者)</p> <p>授課重點 Tracing the history and professionalization of engineers in Post WWII Era through Prof. Deng's oral history</p> <p>閱讀材料或安排事項</p> <p>無求常安: 鄧啟福口述歷史。交通大學出版社</p> <p>HW3 Due</p>
8	04/06	<p>單元主題 Term project supervision (online)</p> <p>授課重點 Discuss your data collection and work-in-progress</p> <p>閱讀材料或安排事項 Mandated office hour</p>
9	04/13	<p>單元主題 Global exchange, feedback and comment (joined with UVA students)</p> <p>授課重點 Exchange your work and comment with your US partner through Discord</p> <p>閱讀材料或安排事項 HW4 Due</p>
10	04/20	<p>單元主題 Debriefing the GC experience (in-class seminar)</p> <p>授課重點 Discussion and reflection on your communication and exchange experience with the US peer.</p> <p>閱讀材料或安排事項</p> <p>對話 Sean Ferguson (Engineering & Society, UVA)</p>
11	04/27	<p>單元主題 Engineers and Humanities Education</p> <p>授課重點 Why should engineers take humanities courses? What would the courses look like? How can STS faculty help prepare engineering talent for the 21st century?</p> <p>對話 Prof. 陳一平，陽明交大博雅書院院長</p>
12	05/04	<p>單元主題 Engineers & Gender</p> <p>授課重點 Is engineering gendered? What role does gender play in engineering education and professionalization in different societies?</p> <p>閱讀材料或安排事項</p> <p>Meeting Prof. 顧燕翎，前交通大學女性主義教授，前台北市府公訓中心主任</p> <p>The True Grand Challenge for Engineering: Self-Knowledge https://issues.org/perspectives-the-true-grand-challenge-for-engineering-self-knowledge/ Cech, E. (2015). Engineers and Engineeresses? Self-conceptions and the Development of Gendered Professional Identities. Sociological Perspectives, 58(1), 56–77. Encounter with the Issue of Women in Science and Women Leadership https://www.youtube.com/watch?v=XwNNZE8fR5E</p>
13	05/11	<p>單元主題 Life/Death in the Global Value Chain</p>

		<p>授課重點 What is the life of engineers contextualized in the global value chain? How does geopolitical and global economy impact individual’s career choice, work load, professional and personal life? What self-invention is needed in responding to the rapid development of technologies and changing global politics?</p> <p>閱讀材料或安排事項 Clelland, Donald. (2015). The Core of the Apple: Degrees of Monopoly and Dark Value in Global Commodity Chains. Journal of World-Systems Research. 20. 82. 10.5195/jwsr.2014.564. Documentary: 我的詩篇 https://www.dramasq.co/play/23321-6-1.html Jobs That Will Disappear In The Next 10 Years Due To AI https://www.youtube.com/watch?v=QQ7By5OpLtl</p>
14	05/18	<p>單元主題 Race and Global Engineering Education in the US</p> <p>授課重點 Prof. Sean Ferguson from E&S UVA will join this panel to share his experience and observation of global engineering education from the US perspective and learn from the viewpoints from Taiwanese students.</p> <p>閱讀材料或安排事項 Stoup & Pierrakos (2015) Engineering Students’ Self-Concept Differentiation: Investigation of Identity, Personality, and Authenticity with Implications for Program Retention. ASEE</p>
15	05/25	<p>單元主題 Creative writing with Scott Ezell (I)</p> <p>授課重點 Engineering students are trained to talk about “objective facts” and hide their subjectivity. Such alienation has led to the consequence that most engineers do not know, or feel comfortable to express themselves. However, knowing the “self” —how your gender, cultural, ethnic, and socio-economic backgrounds impact your profession identity, value system, career choice, sense of social responsibility of being an engineer, and what you hope to achieve in engineering and beyond, etc.--is a crucial step to become a responsible/mindful engineers. To explore this often ignored mental space, we will spend two weeks with American poet/multimedia scholar Scott Ezell, exploring the power of images, artifacts and how they tell stories engineering and self-knowledge.</p> <p>閱讀材料或安排事項 Why Creative Writing Matters for engineering education: https://www.theguardian.com/books/booksblog/2015/apr/07/subconscious-mind-creative-writing-mark-haddon-michelle-paver</p> <p>About Scott Ezell</p>

		http://www.scottezell.org/ In class writing exercise HW5 Homework assignment: Bring three photos/images you took from the previous HW that best represent your view about engineering self, social life and worldview. You will be guided to work with these images and produce a hand write letter “ A Letter to My Future Self”.
16	06/01	單元主題 Creative writing with Scott Ezell (II) 授課重點 Sharing your creative writing piece and responding to comments from the audience 閱讀材料或安排事項
17	06/08	單元主題 Term project presentation (joined by UVA students and instructor) 授課重點 閱讀材料或安排事項
18	06/15	單元主題 Term project presentation (joined by UVA students and instructor) 授課重點 閱讀材料或安排事項

※ 請老師遵守智慧財產權觀念。請同學勿使用非法影印教科書。

備註：

1. 其他欄包含參訪、專題演講等活動。
2. 如需本課程綱要表格之電子檔，請至課務組網頁－>各類申請表下載。
3. 請用電腦打字成檔案，於每學期末、初選前（1月初及6月初），利用選課系統（<http://cos.adm.nctu.edu.tw/>）之「課程綱要上傳」將課程綱要 update 上網。
4. 本校通識教育以全人教育為願景，目標在增進學生適性發展的多元能力，實現：
 - 一、強化獨立思考與批判思辨的能力；
 - 二、認識世界文明與傳承文化經典；
 - 三、跨越不同知識領域，發展多元智能；
 - 四、關懷當代人類生活，擴展國際視野；
 - 五、培養在地關懷，提升公民意識與社會參與；
 - 六、增進理性溝通與領導才能。