114 學年度 第 **1** 學期 **永續數據分析** 課程大綱　　結束　　列印本頁

課程中文名稱 Title of Course in Chinese：**永續數據分析**
課程英文名稱 Title of Course in English：**Sustainability and ESG Data Analytics**
應修系級 Major：**資訊管理研究所1 ,財務金融英語碩士學位學程1 ,財務金融英語碩士學位學程2 ,智慧醫療管理英語碩士學位學程1 ,智慧醫療管理英語碩士學位學程2 ,英語授課商學碩士學分學程 ,城市治理英語碩士學位學程1 ,城市治理英語碩士學位學程2 ,**
授課教師 Instructor：**戴敏育**
選修類別 Required/Elective：**選**
全半學年 Whole or Half of the Academic Year：**半**學年
學　　分 Credit(s) ：**3** 學分
時　　數 Hour(s)：**3** 小時

教師網址 Instructor's Website ：http://web.ntpu.edu.tw/~myday/

教師專長 Instructor's Specialty ：人工智慧 (Artificial Intelligence)、生成式AI (Generative AI)、永續綠色金融科技 (ESG and Green Financial Technology)、大數據分析 (Big Data Analytics)、電子商務 (Electronic Commerce)

課綱附檔 Attachments ：

先修科目：無

Prerequisites：None

教學目標：
1. 瞭解永續數據分析基本概念。
2. 具備永續數據分析實務操作能力。
3. 整合大數據分析的創新思維，提升永續發展運作模式。
4. 在永續面向上，憑藉數據分析，研擬永續議題相關因應作為，並培養學生具有從資料中挖掘出具有管理意涵的數據分析基礎能力

Course Objectives：
1. Understand the fundamental concepts of sustainability and ESG data analytics.
2. Equip with Hands-on practices of sustainability and ESG data analytics.
3. Integrate innovative thinking of big data analysis to enhance the operational model of sustainable development.
4. In the context of sustainability, use data analysis to formulate responses to sustainable issues and cultivate students' ability to extract management-relevant data analysis skills from the data.

本課程包含永續發展(SDGs)目標(→點此瞭解永續相關目標←)：
SDG4｜優質教育 (Quality Education)
SDG7｜可負擔的潔淨能源 (Affordable and Clean Energy)
SDG8｜尊嚴就業與經濟發展 (Decent Work and Economic Growth)
SDG9｜產業創新與基礎設施 (Industry, Innovation and Infrastructure)
SDG11｜永續城市與社區 (Sustainable Cities and Communities)
SDG12｜負責任的消費與生產 (Responsible Consumption and Production)
SDG13｜氣候行動 (Climate Action)
SDG17｜夥伴關係 (Partnerships for the Goals)

內容綱要：
本課程介紹永續數據分析基本概念與實務操作。課程內容包括 永續數據分析概論、環境、社會與治理 (ESG) 淨零數位轉型、永續與ESG 資料科學、Web 3.0 和大數據分析在金融科技、綠色永續金融、TCFD 氣候相關財務揭露與En-ROADS 氣候變遷模擬、ESG數據的收集、分析和視覺化、ESG數據報告、

企業永續報告書、ESG數據驗證、人工智慧物聯網在ESG永續應用、使用大型語言模型 (LLMs) 構建檢索增強生成 (RAG) 代理、生成性AI於永續評等和報告生成、與永續數據分析個案研究。
課程與教學特色：
1. 結合 Web3.0介紹大數據分析基本概念、研究議題與實務操作。
2. 提供數據整合溝通企劃的理論與實務概念及工具。
3. 應用於分析各領域的資料，並透過資料視覺化的方式呈現分析結果。
預期社會影響：
1. 由數據分析學習，培養面對永續議題與風險時，因應作為分析能力。
2. 培養具備大數據分析基本概念、研究議題、實務操作以及永續數據分析實作能力的人才。

Course Outline：
This course introduces the fundamental concepts and hands-on practices of Sustainability and ESG Data Analytics. Topics include Introduction Sustainability and ESG Data Analytics, Environmental, Social, and Governance (ESG) in Net-Zero Digital Transformation, Data Science for Sustainability and ESG, Web 3.0 and Big Data Analysis in Fintech, Green Finance, Sustainable Finance, Task Force on Climate-Related Financial Disclosures (TCFD) and En-Roads Interactive, ESG Data Gathering, Analysis, and Visualization, ESG Data Reporting, Corporate Sustainability Reports, ESG Data Verification, Artificial Intelligence of things (AIoT) in ESG and Sustainability Applications, Generative AI for ESG Rating and Reporting Generation, NVIDIA Building RAG Agents with LLMs, and Case Study on Sustainability and ESG Data Analytics.
Course and Teaching Features:
1. Combine Web3.0 to introduce basic concepts of big data analysis, research topics, and practical operations.
2. Provide theories and tools for data integration and communication planning.
3. Apply to analyze data from various domains and present analysis results through data visualization.
Expected Social Impact:
1. Learn from data analysis, cultivating the ability to analyze responses when facing sustainable issues and risks.
2. Train talents who possess basic concepts of big data analysis, research topics, practical operations, and practical abilities in sustainable data analysis.

學生核心能力關連(Student's Core Competence)：
(八大核心能力為百分比；合計100%；Total 100%)

財務金融英語碩士學位學程 114年 系核心能力：
Communication: Each student will be able to demonstrate proficiency in oral and written communication. 5 %
Teamwork: Each student will demonstrate the ability to work well in teams. 5 %
Professionalism: Each student will have the ability to address and analyze business problems and provide suggestions to the related fields. 60 %
Business values: Each student will be aware of sustainable and ethical issues and their implications. 20 %
Global awareness: Each student will gain global awareness by participating in related activities. 10 %
[-]

資訊管理研究所 114年 系核心能力：
資訊科技新知探索與系統開發應用 80 %
網路行銷企劃能力 10 %
論文寫作與獨立研究能力新知 10 %
[-]

智慧醫療管理英語碩士學位學程 114年 系核心能力：
透過跨領域的學習來培養學生創新思考並解決問題的素養 Students will be cultivated to think innovatively and build the competence of solving problems through cross-disciplinary learning. 50 %
訓練學生智慧醫療管理的專業素養 To train students the professional competence in smart healthcare management 5 %
來自不同文化的學生在學習及討論的過程中，了解彼此的差異、尋求共識，建立溝通協調的能力 To build up the abilities of students from various culture to understand the differences among each other, to seek

the consensus and establish the ability for communication and coordination 5 %
藉由與不同國籍同學之間的合作培養團隊合作精神 To cultivate the spirit of team work through the cooperation among students of various nations 5 %
培養學生關注醫療、商業倫理素養 To cultivate the competence for focusing on healthcare and commercial ethics 5 %
培養學生關注人工智慧議題的專業倫理素養 To cultivate students' professional ethics in artificial intelligence issues 20 %
養成學生對於不同領域之議題之思辨力 To develop students' competence in critical thinking of various fields 5 %
培養跨領域專業人才以因應未來國際趨勢 To cultivate the professional talents of cross-disciplinary in response to the international trends in the future 5 %
[-]

城市治理英語碩士學位學程 114年 系核心能力：
專業知識與跨域整合：培養學生掌握當代城市治理的專業知識，並進行跨域整合的能力 Professional Knowledge and Interdisciplinary Integration: Equip students with contemporary urban governance expertise and the ability to integrate knowledge across domains 70 %
國際多元與團隊合作：培養國際觀與多元尊重，並掌握全球情勢脈動，以進行團隊合作 International Diversity and Teamwork: Develop global perspectives and respect for diversity while understanding global trends to effectively collaborate in teams 10 %
智慧永續與創新思維：培養學生具備資料分析與了解智慧科技的能力，
並應用創新思維於創意城市環境與地方創生的建構 Smart Sustainability and Innovative Thinking: Train students in data analysis and understanding of smart technology, applying innovative thinking to the construction of creative urban environments and local revitalization 10 %
政策制定與執行：培養同學思考公私部門永續發展議題，並以專業跨域整合思維，具備制定與執行政策的能力 Policy Formulation and Implementation: Foster the ability to consider sustainable development issues in the public and private sectors, and to formulate and implement policies with professional interdisciplinary integration thinking 10 %
[-]

校四大基本素養
Four Fundamental Qualities

專業 Professionalism		人際 Interpersonal Relationship		倫理 Ethics		國際觀 International Vision	
創意思考與問題解決 (Creative thinking and Problem-solving) 40 %	綜合統整 (Comprehensive Integration) 30 %	溝通協調 (Communication and Coordination) 5 %	團隊合作 (Teamwork) 5 %	誠信正直 (Honesty and Integrity) 5 %	尊重自省 (Self-Esteem and Self-reflection) 5 %	多元關懷 (Caring for Diversity) 5 %	跨界宏觀 (Interdisciplinary Vision) 5 %

商學院院核心素養目標 (College Competency Goals)：
Communication
Fundamental Skill
Teamwork
Leadership
Professionalism
Research
Business Ethics and Sustainability
Global Awareness

教學進度(Teaching Contents)：

週別 (Weekly Schedule)	日期 (Date)	教學預定進度 (Tentative teaching schedule)	教學方法與教學活動 (Teaching methods

		(若有調整，依教師實際授課為準;Adjustments are made according to instructor's actual teaching schedule)	and activities)
Week 1	20250910	Introduction Sustainability and ESG Data Analytics	講授Lecture 討論Discussion
Week 2	20250917	Environmental, Social, and Governance (ESG) in Net-Zero Digital Transformation	講授Lecture 討論Discussion 實習Practicum
Week 3	20250924	Data Science for Sustainability and ESG	講授Lecture 討論Discussion 實習Practicum
Week 4	20251001	Case Study on Sustainability and ESG Data Analytics I	討論Discussion
Week 5	20251008	Web 3.0 and Big Data Analysis in Fintech, Green and Sustainable Finance	講授Lecture 討論Discussion 實習Practicum
Week 6	20251015	ESG Data Gathering, Analysis, and Visualization	講授Lecture 討論Discussion 實習Practicum
Week 7	20251022	NVIDIA Building RAG Agents with LLMs Part I: LLM Services and AI Foundation Models	講授Lecture 討論Discussion 實習Practicum
Week 8	20251029	Self-Learning	其他Others
Week 9	20251105	Midterm Project Report	討論Discussion
Week 10	20251112	NVIDIA Building RAG Agents with LLMs Part II: Document Loading, Chunking, and Embeddings	講授Lecture 討論Discussion 實習Practicum
Week 11	20251119	NVIDIA Building RAG Agents with LLMs Part III: Retrieval-Augmented Generation with Vector Stores and RAG Evaluation	講授Lecture 討論Discussion 實習Practicum
Week 12	20251126	Case Study on Sustainability and ESG Data Analytics II	討論Discussion
Week 13	20251203	Artificial Intelligence of things (AIoT) in ESG and Sustainability Applications	講授Lecture 討論Discussion 實習Practicum
Week 14	20251210	Generative AI for ESG Rating and Reporting Generation	講授Lecture 討論Discussion 實習Practicum
Week 15	20251217	Final Project Report I	討論Discussion
Week 16	20251224	Final Project Report II	討論Discussion
彈性補充教學		課程於16週內上完，彈性補充教學規劃如下： ☐ 問題討論 ☐ 翻轉教學 ☐ 展演實作 ☐ 校外參訪 ☐ 校內外各類演講/講座 ☐ 線上作業 ☐ 數位自學 ☐ 課業輔導 ☐ 遠距教學(同步) ☐ 遠距教學(非同步) ☑ 學生自主學習 ☑ 其他 彈性補充教學規劃主要為學生自主學習，目標為培養學生的終身學習能力，並鼓勵根據個人興趣與職涯規劃，進行探索式學習。這是一項完全自主、非強制性且不列入成績評量的學習活動，實施方式為提供多元化學習資源，支持學生自我精進。	

評量方式(Evaluation Methods)：

課堂之前測(Pre-test) 0 %	課堂之隨堂測驗(Quiz) 0 %
期中考-筆試(Mid-Term Exam) 0 %	期末考-筆試(Final Exam) 0 %
個案分析報告(Case Report) 10 %	課堂參與(Class Participation) 10 %

個人報告(Individual Presentation) 60 %　　團體報告(Group Presentation) 10 %
作業(Assignment) 10 %
其他評量方式(Other Evaluation Methods)

指定用書(Required Texts)：
Cino Robin Castelli, Cyril Shmatov (2022), Quantitative Methods for ESG Finance, Wiley

參考書目(Reference Books)：
1. Simon Thompson (2023), Green and Sustainable Finance: Principles and Practice in Banking, Investment and Insurance, 2nd Edition, Kogan Page.
2. Chrissa Pagitsas (2023), Chief Sustainability Officers At Work: How CSOs Build Successful Sustainability and ESG Strategies, Apress.
3. Hariom Tatsat, Sahil Puri, Brad Lookabaugh (2020), Machine Learning and Data Science Blueprints for Finance: From Building Trading Strategies to Robo-Advisors Using Python, O'Reilly Media
4. Aurélien Géron (2022), Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 3rd Edition, O'Reilly Media.
5. Chris Kelliher (2022), Quantitative Finance With Python: A Practical Guide to Investment Management, Trading, and Financial Engineering, Chapman and Hall/CRC.
6. Yves Hilpisch (2020), Artificial Intelligence in Finance: A Python-Based Guide, O'Reilly Media.
7. Abdullah Karasan (2021), Machine Learning for Financial Risk Management with Python: Algorithms for Modeling Risk, O'Reilly Media.
8. Yves Hilpisch (2018), Python for Finance: Mastering Data-Driven Finance, 2nd Edition, O'Reilly Media.
9. Numa Dhamani and Maggie Engler (2024), Introduction to Generative AI, Manning.
10. Denis Rothman (2024), Transformers for Natural Language Processing and Computer Vision - Third Edition: Explore Generative AI and Large Language Models with Hugging Face, ChatGPT, GPT-4V, and DALL-E 3, 3rd ed. Edition, Packt Publishing.

其他參考資料(Other References)：
1. GRI (Global Report Initiative): https://www.globalreporting.org/
2. CDP (Carbon Disclosure Project): https://www.cdp.net/
3. SASB (Sustainability Accounting Standards Board): https://sasb.org/
4. ISSB (International Sustainability Standards Board): https://www.ifrs.org/groups/international-sustainability-standards-board/
5. TCFD (Task Force on Climate-related Financial Disclosures): https://www.fsb-tcfd.org/
6. Research Papers