



University of
Nottingham
UK | CHINA | MALAYSIA



UNNC - IUE, CAS Doctoral Training Partnership

It's essential that you have contacted the [UNNC](#) and/or IUE supervisors before applying.

Formal applications should follow the instructions in '[How to apply](#)' section.

Research areas

- Urban Ecology and Health
- Urban Pollution Control and Restoration
- Urban Environmental Engineering and Circular Economy
- Urban Environmental Planning and Management

Available PhD Topics

PhD topic	Unveiling Phyllosphere Virome through Metagenomic Data Mining
IUE Supervisor	Prof Yao-Yang Xu
UNNC Supervisor(s)	Dr Meili Feng
Short introduction & description of PhD project	The phyllosphere, the aerial part of plants, harbors a diverse community of microorganisms. These microorganisms play crucial roles in plant health, growth, and the overall ecosystem functioning. Among them, the viral community within the phyllosphere, known as the virome, remains relatively under - explored. Metagenomic data of phyllosphere microorganisms provides a rich resource for understanding the composition and functions of this virome. Given this context, mining the virome from phyllosphere microbial metagenomic data to reveal its composition and auxiliary metabolic functions is of great significance for comprehensively understanding the ecological roles of phyllosphere microorganisms and their impact on plants. In this project, the candidate is expected to utilize advanced bioinformatics techniques (such as metagenomic sequence assembly, gene prediction, and functional annotation) to analyze large - scale phyllosphere microbial metagenomic data. The aim is to identify the composition of the virome, explore its auxiliary metabolic functions, and understand the interactions between phyllosphere viruses and their host microorganisms. Competitive candidates should be highly motivated and proficient in bioinformatics data analysis. Additionally, a solid foundation in microbiology and a strong ability in data interpretation are highly valued in this project.
Contact points	Informal inquiries may be addressed to Prof Yao-Yang Xu (yxyu@iue.ac.cn), and Dr Meili Feng (meili.feng@nottingham.edu.cn).

PhD topic	Research on the pathway of carbon peak carbon neutrality for building sector
IUE Supervisor	Jianyi Lin
UNNC Supervisor(s)	Wu Deng
Short introduction & description of PhD	President Xi Jinping announced to achieve carbon peaks by 2030, and strive to achieve carbon neutrality by 2060 at the United Nations General Assembly on September 22, 2020. Carbon neutrality has become an important national strategy. The visions of 2030 and 2060 provide clear goals and specific timetables for the country's energy revolution aimed at energy transition. As one of the three energy-consuming sectors of industry, transportation, and buildings, the building sector is closely related to energy consumption and carbon emissions. Energy transition and carbon neutrality will inevitably have a huge impact on the development of this sector. How to achieve carbon peaking and carbon neutrality in the construction sector is not only an urgent problem faced by relevant government departments, but also a hot topic of current research.
Contact points	Informal inquiries may be addressed to Prof Jianyi Lin (jylin@iue.ac.cn) and Prof Wu Deng (wu.deng@nottingham.edu.cn), but formal applications should follow the instructions in 'How to apply' section.
PhD topic	Sustainable management of plastics under the climatic and non-climatic challenges of the Chinese Urban future
IUE Supervisor	Prof Dr Wei-Qiang Chen
UNNC Supervisor(s)	Prof Dr Faith Chan
Short introduction & description of PhD	We expect to have a doctoral student working on the following aspects: (1) to build a database on material flows, trade, and life cycle assessment of materials including plastics, and critical metals that are related to the water and carbon nexus; (2) to explore patterns of the community's plastics recycling and the integration of social science (e.g. gender, elderly) with plastics perception and recycling patterns. Also, the involvement with NGOs and the effects on the circular economy of r-Plastics (e.g. PP5); - and (3) to identify priorities and policies for sustainable management of materials; (4) could also project the future nexus and MFA/LCA with climatic projections The candidate is expected to have an excellent language skill (English and Chinese) and technical skills in handling big data and relevant geospatial techniques and preferably a solid understanding of industrial ecology, environmental engineering, circular economy, climate change, floods, droughts and urban water knowledge. We prefer candidates with a strong background in these research areas, such as finishing the relevant Bachelor's and Master's studies in GIS, Geography, Environmental Science, Environmental Toxicology, Organic Chemistry, Hydrology, Urban Planning, and Computer Sciences in these research directions. Candidates are expected to have good maturity and passion to take on the research pressure and challenges, with research experience from a High-Quality Master's degree (i.e. from the CAS system or top Universities in China or worldwide) or from your employment experiences (research assistantship experience from the CAS system preferable). Plus, my experience in publishing high-standard journal publications also will show the advancement. We expect candidates to be independent and have a strong research interest to work with our research groups at the University of Nottingham (across campuses) and the

	CAS IUE in Xiamen Terminal Centre and willing to spend equity of time during the funding period of 36 months. In particular, we welcome candidates who are willing to develop novel open-source geospatial technology in the context of urban resilience. An exact research proposal is encouraging the submission of your application that discusses concepts and presents models and methods for building strategies, plans, and actions to accomplish sustainable development of urban resilience systems in an uncertain world (we are not expecting the research to only focus in Chinese cities and could be focused on the global pattern).
Contact points	Informal inquiries may be addressed to Prof Faith Chan (Faith.Chan@nottingham.edu.cn), and Prof Weiqiang Chan (wqchen@iue.ac.cn).
PhD topic	Integrating geoinformation and avian biodiversity data for ecosystem assessment
IUE Supervisor	Prof Yao-Yang Xu
UNNC Supervisor(s)	Prof Nicholas Hamm
Short introduction & description of the PhD project	Project Description Avian biodiversity serves as a key indicator of ecosystem health, yet the integration of bird-related data with geospatial information remains a challenge in large-scale ecosystem assessments. This PhD project aims to develop a comprehensive framework for integrating geoinformation and avian biodiversity datasets to enhance the understanding of spatial and temporal patterns of bird populations and their ecological functions. The project will involve but is not limited to: 1.Data Integration: Combining heterogeneous geospatial datasets (e.g., land cover, climate variables, and remote sensing data) with avian biodiversity data, including species distribution and population trends. 2. Geostatistical Modelling: Applying advanced spatial and spatiotemporal modelling techniques to evaluate patterns and correlations between bird biodiversity and environmental variables. 3. Ecological Risk Assessment: Assessing the impacts of anthropogenic activities, such as land-use changes and pollution, on bird populations and their habitats. Expected Outcomes The project will provide a detailed understanding of the spatial distribution and ecological significance of avian species, contributing to improved strategies for biodiversity conservation. It will also establish innovative methods for integrating complex environmental datasets to address broader ecological and environmental challenges. Candidate Requirements Ideal candidates should have a strong foundation in geoinformation science, spatial modelling, and ecological data analysis. Familiarity with machine learning, statistical modelling, and programming is highly desirable. A passion for biodiversity and environmental conservation will be advantageous.
Contact points	Informal inquiries may be addressed to Prof Yao-Yang Xu (yyxu@iue.ac.cn), and Prof Nicholas Hamm (Nicholas.Hamm@nottingham.edu.cn).
PhD topic	Microbial responses to environmental microplastic pollution from an AI perspective

IUE Supervisor	Prof Yao-Yang Xu
UNNC Supervisor(s)	Prof Jun He
Short introduction & description of the PhD project	Microplastic pollution has become a global environmental concern. Microplastics, which are small plastic particles with a diameter less than 5 mm, are widely distributed in various ecosystems. Environmental microorganisms are integral to ecological processes, being involved biogeochemical cycling and maintaining ecosystem functions. The presence of microplastics has been shown to impact the environmental microbiome, potentially disrupting these essential ecological processes. Given this context, understanding how microorganisms respond to environmental microplastic pollution is of great importance for evaluating the ecological risks and potential remediation strategies. In this project, the candidate is encouraged to use advanced artificial intelligence techniques (e.g. natural language processing, large language models, topic modeling, and machine learning) to analyze large-scale bioinformatic and non-bioinformatic data related to microplastic pollution and environmental microorganisms. The goal is to identify the key microbial taxa and functional genes that are associated with microplastic pollution and to uncover the underlying mechanisms of microbial responses. Competitive candidates should be highly motivated and skilled in applying AI techniques. Additionally, well-developed mathematical and statistical modelling ability is appreciated in this project.
Contact points	Informal inquiries may be addressed to and Prof Yong-Guan Zhu (ygzhu@iue.ac.cn), Prof Yao-Yang Xu (yyxu@iue.ac.cn), and Prof Jun He (Jun.He@nottingham.edu.cn)
PhD topic	Manganese Oxide-Supported Single-Atom Pt Catalysts for Enhanced Toluene Oxidation: A Sustainable Approach to VOCs Degradation
IUE Supervisor	Prof. Hongpeng Jia
UNNC Supervisor(s)	Prof Jun He
Short introduction & description of the PhD project	Toluene, a widely used volatile organic compound (VOC), significantly contributes to air pollution and poses substantial risks to human health and the environment. It is primarily emitted from industrial processes, vehicle exhausts, and common household products, leading to serious health issues such as respiratory disorders, neurological damage, and potential carcinogenic effects. Furthermore, toluene is integral to the formation of ground-level ozone and fine particulate matter, both of which are critical components of smog. Consequently, the urgent necessity for effective degradation technologies to mitigate toluene emissions has gained prominence. Traditional abatement strategies for toluene include adsorption, condensation, and biological degradation. However, these methods often face significant challenges, such as high operational costs, secondary pollutant generation, and limited efficiency at low concentrations. Catalytic oxidation has emerged as a promising alternative, capable of converting toluene into benign by-products like carbon dioxide and water at relatively lower temperatures. The efficiency of this oxidation process heavily relies on the catalyst employed. Platinum (Pt)-based catalysts are recognized for their superior catalytic activity and resistance to deactivation during toluene oxidation. However, the high cost and scarcity of platinum pose challenges for large-scale industrial applications. In response, researchers are increasingly focusing on single-atom catalysts (SACs), which offer an innovative solution by maximizing the utilization of noble metal atoms. This approach not only enhances catalytic performance but also reduces the overall precious

	metal consumption. Manganese oxide (MnOx) serves as an advantageous support material for SACs, enhancing catalytic activity through its excellent redox properties, which facilitate the activation of oxygen species necessary for toluene oxidation. The combination of MnOx with single-atom Pt is anticipated to clarify the synergistic interaction that enhances both stability and catalytic efficiency. This research aims to develop manganese oxide-supported single-atom Pt catalysts tailored for efficient toluene degradation. By optimizing the synthesis process and elucidating the reaction mechanisms, the study seeks to improve platinum dispersion and durability on the manganese oxide support. The expected outcomes of this project include identifying optimal operational conditions and establishing a cost-effective solution for toluene degradation, thereby contributing to pollution control and fostering sustainable industrial practices. Such innovations are crucial for addressing escalating environmental and public health concerns linked to VOC emissions.
Contact points	Informal inquiries may be addressed to Jun He (Jun.He@nottingham.edu.cn) and Hongpeng Jia (hpjia@iue.ac.cn).
PhD topic	Sustainable management of plastics under the climatic and non-climatic challenges of the Chinese Urban future
IUE Supervisor	Prof Dr Wei-Qiang Chen
UNNC Supervisor(s)	Prof Dr Faith Chan
Short introduction & description of PhD	We expect to have a doctoral student working on the following aspects: (1) to build a database on material flows, trade, and life cycle assessment of materials including plastics, and critical metals that are related to the water and carbon nexus; (2) to explore patterns of the community's plastics recycling and the integration of social science (e.g. gender, elderly) with plastics perception and recycling patterns. Also, the involvement with NGOs and the effects on the circular economy of r-Plastics (e.g. PP5); - and (3) to identify priorities and policies for sustainable management of materials; (4) could also project the future nexus and MFA/LCA with climatic projections The candidate is expected to have an excellent language skill (English and Chinese) and technical skills in handling big data and relevant geospatial techniques and preferably a solid understanding of industrial ecology, environmental engineering, circular economy, climate change, floods, droughts and urban water knowledge. We prefer candidates with a strong background in these research areas, such as finishing the relevant Bachelor's and Master's studies in GIS, Geography, Environmental Science, Environmental Toxicology, Organic Chemistry, Hydrology, Urban Planning, and Computer Sciences in these research directions. Candidates are expected to have good maturity and passion to take on the research pressure and challenges, with research experience from a High-Quality Master's degree (i.e. from the CAS system or top Universities in China or worldwide) or from your employment experiences (research assistantship experience from the CAS system preferable). Plus, my experience in publishing high-standard journal publications also will show the advancement. We expect candidates to be independent and have a strong research interest to work with our research groups at the University of Nottingham (across campuses) and the CAS IUE in Xiamen Terminal Centre and willing to spend equity of time during the

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Contact points	Informal inquiries may be addressed to Prof Faith Chan (Faith.Chan@nottingham.edu.cn), and Prof Weiqiang Chan (wqchen@iue.ac.cn).
PhD topic	Urban future embedding with soil ecology and Nature-Based Solutions
IUE Supervisor	Prof Xin Sun
UNNC Supervisor(s)	Prof Dr Faith Chan
Short introduction & description of PhD	Urbanisation and human-induced factors largely enhance ecological and environmental degradation in cities in the Asian Region. During COP 16, IUCN and international organisations voice out to conserve and protect our ecology, especially for the cities which have high ecological values (e.g. wetlands and mangroves). Our urban environment is particularly fragile by the evidence of current soil and water pollution. This research is looking at the mechanisms to restore our urban soil and water environments, and the interactions between our ecology (e.g. birds) to react and interact with the urban spaces. In prior, we are going to find possible solutions to improve the urban ecology and cope with the idea of promoting Nature-Based Solutions (i.e. Sponge Cities and Beauty China) for enhancing the sustainable urban future in China and the Asia-Pacific region. Competitive candidates should be highly motivated and have a background in urban ecology, urban planning, climate policies and basic geospatial and mapping skills. The ability to study both independently and collaboratively in a research team from IUE, UNNC and UNUK is required.
Contact points	Informal inquiries may be addressed to Prof Faith Chan (Faith.Chan@nottingham.edu.cn) and Prof Xin Sun (xsun@iue.ac.cn).
PhD topic	Future Resilient Coastal Cities with Nature-Based Solutions
IUE Supervisor	Prof Tao Lin
UNNC Supervisor(s)	Prof Dr Faith Chan
Short introduction & description of PhD	Coastal cities face emerging challenges due to climatic and human-induced factors such as rapid urbanisation and land use changes to reduce the blue-green spaces for water storage. The coastal cities face the “compound” effect on coastal and inland/urban flood hazards and risks. For this PhD project, we are seeking a candidate who focuses on developing an innovative framework for urban planning and climate adaptation policies that combine with the concepts and theories on “Nature-Based Solutions” and further development of the coastal sponge cities. This idea is merged with the latest calls on COP 29 and IPCC AR6 that voice out to improve climate resilience in coastal cities, especially under the populated and rapid developments in the Asia-Pacific context. Competitive candidates should be highly motivated and have a background in urban planning, climate policies and basic geospatial and mapping skills. The ability to study

	both independently and collaboratively in a research team from IUE, UNNC and UNUK is required.
Contact points	Informal inquiries may be addressed to Prof Faith Chan (Faith.Chan@nottingham.edu.cn) and Prof Tao Lin (tlin@iue.ac.cn).
PhD topic	Aquatic biodiversity in a sustainable city
IUE Supervisor	Prof Yaoyang XU
UNNC Supervisor(s)	Prof Dr Faith Chan ; Dr Meili Feng
Short introduction & description of PhD	Aquatic biodiversity is one of the most important topics in the global biodiversity framework and sustainable development goals, as it is related directly and indirectly to a sustainable city. We seek candidates for the DTP program to develop a systematic workflow of data mining that can be applied to quantify the complex relationships between aquatic biodiversity and urban sustainability across the world. The candidate is expected to use the mixed methods approaches in this research (e.g. Quantitative and Qualitative methods) and undertake the combined approaches to understand the new way of managing aquatic biodiversity in the urban future. Competitive candidates should be highly motivated. The ability to study both independently and collaboratively in a team environment is required.
Contact points	Informal inquiries may be addressed to Prof Faith Chan (Faith.Chan@nottingham.edu.cn), Dr Meili Feng (Meili.Feng@nottingham.edu.cn) and Prof Yaoyang Xu (yyxu@iue.ac.cn).
PhD topic	Future Food System and Climate Change
IUE Supervisor	Prof Gang Li
UNNC Supervisor(s)	Dr Faith Chan
Short introduction & description of the PhD project	China like many other countries is facing food security issues for the growing population under climatic extremes (Floods and Droughts) and other uncertainties. The nation keeps importing major grains (e.g. soybeans, wheat, corn, etc.) overseas to supply the local intakes is not a sustainable option. Future challenges arise as we urgently require sustainable solutions in terms of more resilient solutions. This project seeks for the candidates to look at the policy and international trade of food including the latest export and import conditions to China and the Asia Pacific Region. In fact, China now has imported most of the crops and meat and dairy products which implies the country has not been able to produce enough food to supply the current 1.4 billion population. In particular, we hope the candidate can deliver qualitative and quantitative approaches that look at solutions and develop new ideas with Prof Zhu and myself to innovate and deliver multiple benefits including the latest ideas on zero-pesticides and herbicides that combine with the “One-Health” concept and practice in this project that addresses the sustainable development goals (SDGs) for China.
Contact points	Informal inquiries may be addressed to Prof Faith Chan (faith.chan@nottingham.edu.cn) and Prof Gang Li (gli@iue.ac.cn).
PhD topic	High-value Re-utilisation of Biomass Gasification Ash from Multiple Sources
IUE Supervisor	Prof Hang Xiao
UNNC Supervisor(s)	Dr Shu Liu

Short introduction & description of the PhD project	Biomass ash, a by-product of biomass combustion and gasification, has become an environmental concern due to the challenges associated with its disposal. As the global shift towards renewable energy sources accelerates, the volume of biomass ash continues to grow, creating an urgent need for innovative and sustainable management solutions. This project focuses on harnessing the valuable components of multi-sourced gasification biomass ash and advancing its utilization, particularly through its transformation into high-purity silica (white carbon black) and low-carbon cementitious/construction materials. Utilizing these components not only addresses waste management challenges but also contributes to the circular economy by converting waste into valuable resources. This approach aligns with sustainability goals and promotes the efficient use of renewable energy by-products.
Contact points	Informal inquiries may be addressed to Shu Liu (shu.liu@nottingham.edu.cn).

Other potential supervisors

UNNC		
Profile	Research area(s)	Email
Bo LI	3,4	bo.li@nottingham.edu.cn
Bencan TANG	2,3	bencan.tang@nottingham.edu.cn
Xinyu ZHANG	2	xinyu.zhang@nottingham.edu.cn
Yong REN	2,3,4	yong.ren@nottingham.edu.cn
Tengwen LONG	1,2	tengwen.long@nottingham.edu.cn
IUE, CAS		
Profile	Research area(s)	Email
CAI Chao	2	ccai@iue.ac.cn
Chen Jinsheng	2	jschen@iue.ac.cn
CUI Li	1	lcui@iue.ac.cn
HUANG Qiansheng	1	qshuang@iue.ac.cn
REN Yin	1,4	yren@iue.ac.cn
SHAN Wenpo	2	wpshan@iue.ac.cn
SU Jianqiang	1	jqsu@iue.ac.cn
SUN Qian	2	qsun@iue.ac.cn
YE Zhilong	3	zlye@iue.ac.cn
YU Guangwei	3	gwyu@iue.ac.cn
ZHAO Feng	2	fzhao@iue.ac.cn