UNNC - IUE, CAS Doctoral Training Partnership

Available PhD Topics

Formal applications should follow the instructions in 'How to apply' section.

PhD topic 1	**Microfluidic fabrication of functional microparticles for removing heavy metal ions from waste water**
IUE Supervisor	Prof. Shaohua Chen
UNNC Supervisor(s)	Dr Yong Ren
Short introduction & description of PhD	The development of effective methods for low concentration heavy metal ion separation from waste water remains a challenge for industrial applications, especially the electroplating industries. This project aims to develop microfluidic systems for fabrication of microparticles for heavy metal ion treatment by two approaches: the microparticles will be functionalized with chelating agents and photocatalysts. We will investigate the ion capture and conversion mechanisms, and compare the treatment efficiency.
Contact points	Informal inquiries may be addressed to Prof. Shaohua Chen (shchen@iue.ac.cn) and Dr. Yong Ren (yong.ren@nottingham.edu.cn)

PhD topic 2	**Sustainable sediment extraction – a non-renewable resource from the coastal and fluvial ecosystems perspective**
IUE Supervisor	Prof Wei-Qiang Chen
UNNC Supervisor(s)	Dr Faith Chan
Short introduction & description of PhD	Sediments (sand and gravel) from coastal and riverine environments are used extensively in construction, such as the preparation of concrete and building materials for the urban infrastructure (e.g. pavements, roads, etc.). For example, each tonne of cement may require about seven folds of sand and gravel. The global use of aggregates for concrete to be annually reached about 30 billion tonnes. That said, sediments are mined globally, account for the largest volume of soil materials, and rank the highest volume of raw materials used on earth after water resources. In this project, the candidate has opportunities to develop the research ideas on: 1. Assess the colossal quantities of sediment being extracted by riverine and coastal (river beds and coastal shoreline or shallow coastal sea beds); 2. Investigate the most significant impacts through the sediment extraction on the fluvial and deltaic (coastal) geomorphological impacts on our environments; 3. Evaluate alternatives to sediment for construction, such as using manufactured sand and secondary sources;

	4. Develop the material flow analyses (MFA) and find the relevant information on contributing the global data on aggregates (riverine and coastal sediments) mining that improves the assessment (i.e., Strategic Environmental Assessment – SEA and Environmental Impact Assessment – EIA); 5. Contribute to achieving the sustainable development goals (SDGs) in terms of long-term global sediment extractions, including the life-cycle of aggregates.
Contact points	Informal inquiries may be addressed to Dr Faith Chan (faith.chan@nottingham.edu.cn) and Prof Wei-Qiang Chen (wqchen@iue.ac.cn).
PhD topic 3	**Sustainable urbanization form, green, and metabolism: pattern, process and mechanism**
IUE Supervisor	Dr. Prof. Tao Lin
UNNC Supervisor(s)	Dr Nicholas A. S. HAMM
Short introduction & description of PhD	Urbanization is one of the most powerful anthropogenic forces visible in the world and exert huge impact on global ecosystem. Currently, more than half the global population lives in cities, a proportion that is expected to increase to 70% by 2050 driven by continued urban growth in the developed economies and by urbanization in the Global South. Urbanization not only affects urban areas and urban systems (via population increase and areal expansion) but also the settlements and non-urban areas connected to urban areas. China has been experiencing the most rapid urbanization process on the earth and the interactions between the urban area and natural landscapes have cause multiple social-ecological effects. To explore the sustainable urbanization, we try to (1) analyse the spatial temporal process of urban spatial expansion, (2) connect the urban form and its functions, such as urban metabolism, green infrastructure, and (3) assess the ecological impact and environmental health effect by using spatial modelling techniques and big data.
Contact points	Informal inquiries may be addressed to Prof Tao Lin (tlin@iue.ac.cn) and Dr Nicholas A. S. HAMM (nicholas.hamm@nottingham.edu.cn).
PhD topic 4	**Urban Agriculture by using the Nature-Based Solution" – the case of urban China**
IUE Supervisor	Prof Yong-Guan Zhu and Prof Gang Li
UNNC Supervisor(s)	Dr Faith Chan
Short introduction & description of PhD	China like many other countries is facing food security issues for the growing population under climate 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. The Nature-Based Solution (NBS) and urban agriculture, these concepts provide incentives for extra options for food supply to increase Chinese urban populations but also deliver multiple benefits such as addressing urban health issues, providing green spaces and reducing carbon emissions. In this project, the candidate may consider these remits 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 the Chinese urban future.
Contact points	Informal inquiries may be addressed to Dr Faith Chan (faith.chan@nottingham.edu.cn) and Prof Yong-Guan Zhu (ygzhu@iue.ac.cn) and Prof Gang Li (g.li@iue.ac.cn).

PhD topic 5	Urban Green Infrastructures for human health: Issues, Implications, and Optimal Solutions
IUE Supervisor	Yin Ren (www.iuecasforest.cn)
UNNC Supervisor(s)	Ali Cheshmehzangi
Short introduction & description of PhD	*Based on the high accuracy air pollution map to estimate the exposure risk and then explore the reasonable relation among the urban green infrastructures, air pollution and human health outcome.* Along with the acceleration of global urbanization, the air pollution issues have attracted increasing attention. Concerning the mitigation measures, besides the source emission reductions, nowadays, promoting the absorption and circulation of pollutants through vegetation (e.g., trees) is also one of the main ways to deal with environmental pollution. A considerable volume of literature investigating the associations between green space and air pollution was carried out in different disciplines. Although the air regulation effect of green space received much attention, the influence mechanism among green space, air quality, and human health remain unclear. Studies have reported that urban vegetation would negatively affect urban residents under certain urban forms and plant configurations. The conventional wisdom deems that urban green space improves air quality by reducing gas pollution concentrations and PM, thereby reducing direct harm to human health. However, the actual impact of green space on air pollution remains uncertain. Therefore, this project plans to focus on (i) exploring the relationship between the air influences of green space and human health and (ii) optimizing the urban green space design for a healthier life.
Contact points	Informal inquiries may be addressed to Prof Ali Cheshmehzangi (Ali.Cheshmehzangi@nottingham.edu.cn) and Prof Yin Ren (yren@iue.ac.cn).