PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Mathematics and Physics
Supervisors	Principal supervisor: Dr. Xujun Liu (XJTLU) Co-supervisor: Dr. Aistis Atminas (XJTLU) Co-supervisor: Prof. Gang Liu (XJTLU) Co-supervisor: Dr. Viktor Zamaraev (University of Liverpool)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (worldwide students)
Project Title	Partition graphs into independent sets
Contact	Please email **xujun.liu@xjtlu.edu.cn** (XJTLU principal supervisor's email address) with the subject line of the PhD project title. The principal supervisor's profile is linked here: https://scholar.xjtlu.edu.cn/en/persons/XujunLiu

Requirements:

1. The candidate should have a first-class or upper-second-class honors degree, or a master's degree (or equivalent qualification), in mathematics, theoretical computer science, or related fields.
2. Evidence of good spoken and written English is essential. The candidate should have an IELTS score of at least 6.5 (at least 5.5 in each of Reading, Listening, Speaking, and Writing) if the first language is not English. This position is open to all qualified candidates irrespective of nationality.
3. A course taken in graph theory or discrete mathematics is recommended. Research experience in graph theory or related areas will be an advantage (but not required).

Degree:

The student will be awarded a PhD degree from the University of Liverpool (UK) upon successful completion of the program.

Funding:

The PhD studentship is available for three years subject to satisfactory progress by the student. The award covers tuition fees for three years (currently equivalent to RMB 99,000 per annum). Furthermore, there are also opportunities for students to apply for TA/RA positions to earn some salaries. It also provides up to RMB 16,500 to allow participation at international conferences during the period of the award. The scholarship holder is expected to carry out the major part

of his or her research at XJTLU in Suzhou, China. However, he or she is eligible for a research study visit to the University of Liverpool for up to six months, if this is required by the project.

Project Description:

This project will be focused on graph coloring and extremal graph theory. Topics include but are not limited to packing coloring, packing edge-coloring, square coloring, strong edge-coloring, Ramsey theory, and other extremal problems in graph theory.

Packing colorings are extensions of proper coloring and square coloring (strong edge-coloring). They not only have significant theoretical implications but also have many real-world applications to problems such as frequency assignment problems. In this project, we mainly focus on packing vertex colorings and packing edge colorings of subcubic graphs, and their extensions to graphs with bounded maximum degree. For a non-decreasing sequence $S = (s_1, \dots, s_k)$ of positive integers, an S-packing coloring of a graph G is a decomposition of its vertex set into disjoint sets $V_1, \dots, V_k$ such that for each positive integer i, where $1 \leq i \leq k$, the distance between any two distinct vertices in V_i is at least $1 + s_i$. On one hand, this project will consider a conjecture of Hocquard-Lajou-Luzar that every subcubic planar graph has $(1,1,2,2,2)$-packing edge-coloring and $(1,2,2,2,2,2,2)$-packing edge-coloring. On the other hand, we consider similar problems for graphs with maximum degree Δ, where $\Delta \geq 4$.

We will also consider Ramsey-type problems for paths and cycles, and other problems in extremal graph theory.

For more information about doctoral scholarship and PhD program at Xi'an Jiaotong-Liverpool University (XJTLU), please visit

https://www.xjtlu.edu.cn/en/admissions/global/entry-requirements/

https://www.xjtlu.edu.cn/en/admissions/global/fees-and-scholarship

How to Apply:

Interested applicants are advised to email **xujun.liu@xjtlu.edu.cn** (XJTLU principal supervisor's email address) the following documents for initial review and assessment (please put the project title in the subject line).

- CV
- Two formal reference letters
- Personal statement outlining your interest in the position
- Certificates of English language qualifications (IELTS or equivalent)
- Full academic transcripts in both Chinese and English (for international students, only the English version is required)
- Verified certificates of education qualifications in both Chinese and English (for international students, only the English version is required)
- PDF copy of Master's Degree dissertation (or an equivalent writing sample) and examiner reports available