PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Mathematics and Physics
Supervisors	Principal supervisor: Dr Ran Xu (XJTLU, Financial &Actuarial Mathematics) Co-supervisor: Dr Jiajun Liu(XJTLU, Financial &Actuarial Mathematics) Co-supervisor: Professor Corina Constantinescu (UoL, Mathematical Sciences)
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	Reinforcement learning with application in optimal dividend problems with Parisian implementation delay
Contact	Please email **ran.xu@xjtlu.edu.** with a subject line of the PhD project title. The principal supervisor's profile is linked here: http://www.xjtlu.edu.cn/en/staff-details/staff/ran-xu

Requirements:

1. The candidate should have a first class or upper second class honours degree, or a master's degree (or equivalent qualification), in Mathematics, Applied Mathematics, Probability, Statistics, Data Science, Actuarial Science, Mathematical Finance or related fields with comprehensive training in mathematics.
2. **Good programming skills in Python is essential**, priority will be given to the candidate with programming experience in deep learning or reinforcement learning.
3. Evidence of good spoken and written English is essential. The candidate should have an IELTS score of **6.5 or above** with **no less than 6** in both speaking and writing, if the first language is not English. This position is open to all qualified candidates irrespective of nationality.

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 80,000 per annum). 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 up to six months, if this is required by the project.

Project Description:

The success of the classical stochastic control theory in solving various optimal dividend problems heavily relies on the (theoretical) model assumptions which have brought significant restrictions to the application of the results to the industry practice. However, with the rapid development in data science and machine learning techniques, the so-called reinforcement learning methods can be applied in solving various complex stochastic control problems in Actuarial Science. In this project, we investigate two optimal dividend problems in the frontier by using reinforcement learning. To be specific, we study the optimal dividend strategy with implementation delay, the so-called Parisian delay, in either dividend payout or the recognition of ruin for an insurance company. Such optimal dividend problems are complex and difficult to solve within the framework of classical (stochastic control) methods; hence we tackle them numerically with reinforcement learning methods.

For more information about doctoral scholarship and PhD programme 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 **ran.xu@xjtlu.edu.cn** 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 Degree dissertation (or an equivalent writing sample) and examiners reports if available
- PDF copy of any published or working papers

Informal enquiries may be addressed to Dr Ran Xu (ran.xu@xjtlu.edu.cn) by email.