

Good afternoon,  
You are invited to attend our weekly ECE Graduate Seminar.

**Old Dominion University**  
**College of Engineering and Technology**  
**Department of Electrical and Computer Engineering**

All lectures to be held at 3:00pm on Fridays online at [ODU DL: ECE 731 831 Grad Seminar](#)

For more information, contact Dr. Chung Hao Chen at (757) 683-3475 or email [cxchen@odu.edu](mailto:cxchen@odu.edu).

**Friday, October 1, 2021 Seminar Topic:**

**PROBABILISTIC RELIABILITY AND SECURITY RISK ASSESSMENT** by Dr. Qisi Liu, Ph.D. Visiting Assistant Professor in the Department of Electrical & Computer Engineering at Old Dominion University

**Abstract:**

With advances and globalization of information technology such as big data and cloud computing, topics about potential risks with security vulnerabilities have been brought to the forefront. Considerable efforts have been made to estimate security risk with an unlimited cycle of disclosed vulnerabilities in the form of threats or attacks and managements to migrate these risks. On the other hand, reliability is often considered as one of the most vital factors that affect functioning of critical computing systems. Existing works on risk analysis have mostly focused on either security or reliability, but not both. In addition, the existing approaches for quantifying risks are mostly based on simple multiplications of frequencies and quantitative consequences of hazard occurrence without considering dependencies among the hazards. In this dissertation research, an integrated framework is explored for simultaneously and systematically modeling and quantifying both reliability and security risk of modern technological systems. Under the framework, causes and effects of different risks are investigated. Analytical methods integrating Markov chains and decision diagrams are developed and demonstrated through a case study on the reliability and security risk occurrence probability analysis of a cloud RAID storage system under attacks. In addition, sequential attacks involving multiple sequence-dependent hazardous actions for a successful attack are modeled and demonstrated through a case study on banking applications subject to Trojan attacks. In the future, methods including (but not limited to) semi-Markov processes and multiple integrals will be investigated for considering arbitrary types of distributions in the risk analysis. More dependent and dynamic reliability and security behaviors will be modeled for probabilistic risk assessment of modern complex systems.



**Bio:**

Qisi Liu received her Ph.D. degree in Electrical & Computer Engineering with the Computer Engineering option from the University of Massachusetts Dartmouth in January 2021. Her research interest includes probabilistic reliability and security risk assessment.