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Announces the Ph.D. Dissertation Defense of

**Yingqi Feng**

for the degree of Doctor of Philosophy (Ph.D.)

**Relationship-Aware Model Learning and Explaining for  
Spatiotemporal Systems**

**July 2, 2026, Thursday, 12:30 pm - 2:00 pm**

**Building EE96, Room # 405**

**777 Glades Road**

**Boca Raton, FL**

**Zoom Link: <https://fau-edu.zoom.us/my/tangyfau>**

**DEPARTMENT:**

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LINK TO DISSERTATION DRAFT: <https://www.overleaf.com/read/wcgzkznmdmmd#c26216>

**ABSTRACT OF DISSERTATION**

Spatiotemporal and structured data are widely observed in environmental monitoring, sensor networks, ocean science, transportation, and graph-based applications. In these systems, observations are rarely independent; instead, prediction and interpretation often depend on relationships among variables, locations, time steps, entities, and labels. However, existing models are commonly studied from an architecture-centered perspective, which provides limited insight into how relational information is obtained, represented, utilized, and explained. This dissertation develops a relationship-aware perspective for model learning and explaining in spatiotemporal and structured systems. It first introduces a relationship-aware taxonomy and background that characterizes predictive models according to different forms of relational information, including predefined relationships, data-inferred relationships, and implicitly captured dependencies. Based on this foundation, the dissertation studies three representative problems. First, it develops a missing-aware latent relationship learning framework for robust multivariate time-series forecasting under severe sensor missingness, where imputation, dependency learning, and spectral-temporal forecasting are jointly optimized. Second, it presents a sparse spatiotemporal relationship modeling framework for ocean salinity imputation from irregular drifter trajectories, using global dependency modeling and diffusion-adversarial learning to reconstruct missing salinity values. Third, it extends relationship-aware modeling toward explainability by developing a self-explainable framework for multi-label graph learning, where predictions and label-specific relational explanations are learned jointly. Together, these studies demonstrate that relationships provide a unifying lens for designing robust, accurate, and interpretable models



across different tasks and data conditions. This dissertation contributes both methodological advances and a coherent conceptual foundation for relationship-aware learning and explaining in complex real-world systems.

**BIOGRAPHICAL SKETCH**

Born in China

B.S., Florida Atlantic University, Boca Raton, Florida, 2021

Ph.D., Florida Atlantic University, Boca Raton, Florida, 2026

**CONCERNING PERIOD OF PREPARATION & QUALIFYING EXAMINATION**

**Time in Preparation:** 2021 - 2026

**Qualifying Examination Passed:** Fall 2022

**Published Papers:**

1. Bo Li\* and Yingqi Feng\*, Ming Jin, Xin Zheng, Yufei Tang, Laurent Cherubin, Can Wang, Alan Wee-Chung Liew, et al. "OASIS: Harnessing Diffusion Adversarial Network for Ocean Salinity Imputation Using Sparse Drifter Trajectories." In Proceedings of the 34th ACM International Conference on Information and Knowledge Management, 2025.
2. Yufei Tang, Yingqi Feng, Sasha Fung, Veronica Ruiz Xomchuk, Mingshun Jiang, Tim Moore, and Jordon Beckler. "Spatiotemporal Deep-Learning-Based Algal Bloom Prediction for Lake Okeechobee Using Multisource Data Fusion." IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 2022.
3. Minghao Yu, Yingqi Feng, Bing Ouyang, Paul S. Wills, and Yufei Tang. "Dissolved Oxygen in Aquaculture Ponds: Causal Factors, Predictive Modeling, and Intelligent Monitoring." Aquacultural Engineering, Article 102634, 2025.
4. Minghao Yu, Yingqi Feng, William Fairman, Bing Ouyang, Paul S. Wills, Minghan Wei, and Yufei Tang. "Physics-Guided Transfer Learning for Predicting Dissolved Oxygen in Smart Aquaculture Farms." IET Cyber-Systems and Robotics, vol. 8, no. 1, Article e70053, 2026.

**Papers Under Review:**

1. Yingqi Feng, Yufei Tang, and Xingquan Zhu. "Harnessing Relationships in Time Series Forecasting: A Comprehensive Survey." Submitted to ACM Computing Surveys.
2. Yingqi Feng, Yufei Tang, Yu Huang, and Xingquan Zhu. "Missing-Aware Spectral-Temporal Graph Neural Networks for Robust Multivariate Time-Series Forecasting." Submitted to Neurocomputing.
3. One first-author manuscript on self-explainable graph learning is currently under anonymous peer review. Details are omitted during the review period to preserve anonymity.

**Papers in Preparation:**

1. Bo Li\* and Yingqi Feng\*, Ming Jin, Xin Zheng, Jingwei Yao, Yufei Tang, Laurent Cherubin, Can Wang, Alan Wee-Chung Liew, Qinghua Lu, Hong Zhang, Shirui Pan, and Xingquan Zhu. "Global Ocean Salinity Variability Projection Using Drifters and Geometric Deep Learning." Manuscript in preparation.

\* *Equal contribution / co-first authors.*