Ying-Jen Yang

Curriculum Vitae

Department of Applied Mathematics
University of Washington
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Education

2017 – Current	**Ph.D. candidate**, *Department of Applied Mathematics, University of Washington.* Advisor: Dr. Hong Qian. Accumulated average GPA: 3.96/4.00
2014 – 16	**Master of Science**, *Department of Physics, National Taiwan University (NTU).* Thesis: Anticipatory Dynamics in Adaptive Excitable Systems (doi:10.6342/NTU201600683) Advisor: Dr. Chun-Chung Chen and Dr. C.-K. Chan Overall GPA: 4.19/4.30
2010 – 14	**Bachelor of Science**, *Department of Physics, NTU.* Overall GPA: 3.94/4.30

Honors and Awards

2021	**Excellence in Teaching Award nomination**, *University of Washington.* Highest teaching distinction for student instructor at the University of Washington
2020	**Boeing Research Award**, *Department of Applied Mathematics, University of Washington.* Annual student award for excellent research
2019	**Olga Jung Wan Endowed Fellowship in Applied Mathematics**, *Department of Applied Mathematics, University of Washington.* A one-quarter fellowship for students with excellent performce of Ph.D. qualification exam
2015	**Award of Excellent Poster**, *Annual Meeting of Physical Society of Republic of China.* Excellence in poster presentation and design.
2013 – 14	**College Student Research Fellowship**, *Minister of Science and Technology, Taiwan.* Based on researh proposal
2012	**Scholarship of Cultural and Educational Foundation**, *Taichung County Education Association.* Based on GPA performance

Teaching Experiences

Undergraduate *Ordinary Differential Equation and Applications*, undergraduate *Mathematical Modeling with Continuous Methods*.

Referee

Europhysics Letters, New Journal of Physics.

Research Interest

Stochastic dynamics and statistical physics of living systems:

1. *Probability theory and stochastic thermodynamics*: reversibility, entropy production, cycle, potentials, large deviations, and information theory.
2. *Fluctuation, dissipation, and speed in stochastic dynamics*: fluctuation-dissipation relation, thermodynamic uncertainty relation, information geometry and Fisher information
3. *Collective behaviors and statistical physics of nonequilibrium systems*: complex network, pattern formation, self-organization and emergent phenomena.
4. *Information processing in biological systems*: neuronal computation and cellular network.

Publications

In preparation / under Review

2021   Jeffrey Commons, Y.-J. Yang and H. Qian, "Duality Symmetry, Two Entropy Functions, and Eigenvalue Problem in Gibbs' Theory." *arXiv*: 2108.08948 [cond.mat.stat-mech]

Y.-J. Yang and H. Qian, "Nonequilibrium Stationary Process and Fluctuation-Dissipation Relation." *arXiv*: 2106.13374 [cond.mat, physics:math-ph]

Published / in press

2021   Y.-J. Yang and Y.-C. Cheng, "Potentials of Continuous Markov Process and Random Perturbations." *J. Phys. A: Math. Theor.* **54**, 195001

Y.-J. Yang and H. Qian, "Bivectorial Nonequilibrium Thermodynamics: Cycle affinity, Vorticity potential, and Onsager's principle." *J. Stat. Phys.* **182**, 46

2020   H. Qian, Y.-C. Cheng, and Y.-J. Yang, "Kinematic Basis of Emergent Energetics of Complex Dynamics" *EPL* **131**, 50002

Y.-J. Yang and H. Qian, "Unified formalism for entropy production and fluctuation relations" *Phys. Rev. E* **101**, 022129

2015   Y.-J. Yang, C.-C. Chen, P.-Y. Lai and C.-K. Chan, "Adaptive Synchronization and Anticipatory Dynamical Systems." *Phys. Rev. E* **92**, 030701

List of Teaching & Scholarly Activities

Teaching

2019 – Current   **Instructor**, University of Washington, Seattle.

(2021 Spring) Amath 351 : Introduction to Differential Equation and Applications

(2020 Summer) Amath 383 : Introduction to Continuous Mathematical Modeling

(2020 Spring) Amath 351 : Introduction to Differential Equation and Applications

(2019 Summer) Amath 351 : Introduction to Differential Equation and Applications

2017 – Current   **Teaching Assistant**, University of Washington, Seattle.

(2021 Fall) Amath 567: Applied Complex Analysis

(2021 Winter) Amath 402: Introduction to Dynamical Systems and Chaos

(2020 Fall) Amath 567: Applied Complex Analysis

(2020 Winter) Amath 402: Introduction to Dynamical Systems and Chaos

(2019 Fall) Amath 567: Applied Complex Analysis

(2019 Winter) Math 125: Calculus II (Integration and Differential Equations)

(2018 Fall) Amath 351 : Introduction to Differential Equation and Applications

(2018 Spring) Amath 301 : Beginning Scientific Computing

(2018 Winter) Math 124: Calculus I (Continuity and Differentiation)

(2017 Fall) Math 125: Calculus II (Integration and Differential Equations)

2014 – 16 **Teaching Assistant**, National Taiwan University.

(2016 Spring) Applied Mathematics III: Complex Analysis and Integral Transforms

(2015 Spring) Statistical Physics I: Equilibrium Statistical Mechanics

(2014 Fall) General Physics a-1: Classical Mechanics and Special Relativity

Oral Presentations

2021/07 Ying-Jen Yang, Yu-Chen Cheng, and Hong Qian "Fundamental Roles of Kinetic Cycles in Stochastic Thermodynamics." *Club Nanothermodynamica*

2019/06 Ying-Jen Yang, and Hong Qian, "A Unified Formalism for Entropy Productions and Fluctuation Theorems." *2019 Frontiers of Biophysics.* **Slide**

2016/06 Ying-Jen Yang, Chun-Chung Chen, Pik-Yin Lai and Chi-Keung Chan, "Anticipatory Dynamics in Adaptive Excitable Systems." *2016 Cross-Strait Biological-Inspired Theoretical-problems Symposium.* **Slide**

2016/01 Ying-Jen Yang and Chun-Chung Chen, "Coherent and Anticipatory Dynamics in a Random Network with Dynamical Couplings." *2016 PSROC.* **Slide**

2015/05 Ying-Jen Yang and Chun-Chung Chen, "Adaptive Synchronization and Anticipatory Dynamical System." *2015 Complex System Symposium (CSC)* **Slide**

2014/06 Ying-Jen Yang, Chun-Chung Chen and Chi-Keung Chan, "Modeling rhythmic memory with simple excitable systems." *Statphys-Taiwan* and *CSC.* **Slide**

Poster Presentations

2021/10 Ying-Jen Yang, Yu-Chen Cheng, and Hong Qian "Probabilistic origins of energy and entropy production in stochastic dynamics." *Gordon Research Conferences: Stochastic physics in biology.*

2015/01 Ying-Jen Yang, Chun-Chung Chen, Pik-Yin Lai and Chi-Keung Chan, "Anticipative Time Perception in an Adaptive Excitable System." *2015 PSROC* **Poster**

2014/01 Ying-Jen Yang, Chun-Chung Chen and Chi-Keung Chan, "Modeling Rhythmic Memory With Self-Tuning FitzHugh-Nagumo Dynamics." *2014 PSROC*

Other Experience

2020 – Current **Organizer of Math. Bio Reading Group**, *Department of Applied Mathematics, University of Washington, Seattle..*

2018 – 2020 **Webmaster**, *Society of Industrial and Applied Mathematics, University of Washington Student Chapter.*

2016 – 2017 **Alternative Military Service in Education**, *National Feng-yuan Senior High School.*