



## PhD Opening at CLAMS

The Computational Laboratory for Advanced Manufacturing and Sustainability, or CLAMS (<https://checlams.github.io/>), is led by Dr. Zheyu Jiang, associate professor in chemical engineering at University of South Florida. At CLAMS, we develop mathematical and computational theories and tools to tackle some of the most pressing and interdisciplinary challenges, including industrial decarbonization, digital agriculture, and food-energy-water nexus. The group is currently seeking one highly motivated and creative student to join the group as Graduate Research Assistant (GRA) starting in Fall 2027.

### WHAT WE DO

- **Multi-scale modeling:** We develop efficient neural operator solvers for modeling complex physiochemical phenomena and processes in various engineering and sustainability applications, such as water infiltration in soil for digital agriculture, CO<sub>2</sub> transport in shale reservoirs for carbon sequestration and storage, electrolyzer and fuel cell modeling for clean energy production, and so on.
- **AI for Science:** We develop digital twin solutions combining physics-based first principles with data-driven techniques for applications such as variable renewable energy (e.g., solar and wind) forecasting, electricity market price prediction, and battery systems prognosis and optimization. We also develop accurate and scalable algorithms to solve inverse problems (e.g., parameter estimation and uncertainty quantification) for these engineering and environmental applications.
- **Optimization:** We develop deterministic, stochastic, and quantum optimization models and efficient algorithms to solve critical problems, such as: 1) privacy-preserving decentralized optimization algorithms for joint operation, maintenance, and planning of modern energy systems; and 2) designing resilient infrastructures and supply chains for food and chemicals (e.g., plastic waste and battery waste upcycling) using distributionally robust optimization.
- **Agentic AI:** By leveraging latest advancements in agentic AI, we develop new explainable AI architectures and platforms guided by rigorous mathematical theories to enhance interpretability and explainability, improve accuracy, ensure underlying physics, and/or preserve data privacy of classic AI/ML methods in solving problems related to clean energy technologies, digital agriculture, materials design and discovery, and so on.
- **Optimal control:** We develop new theories and algorithms in safe reinforcement learning, PDE-constrained optimal control to smoothly integrate hard safety constraints with provable convergence and optimality properties for optimal control of various problems, including batch crystallization for pharmaceutical manufacturing, building energy management, agricultural irrigation, etc.

### WHY YOU SHOULD JOIN

- **Dr. Jiang received the CAREER Award from the U.S. National Science Foundation.** This is the NSF's most prestigious award in support of early-career faculty who have the potential to serve as academic role models in research and



education. You will be working on this exciting NSF CAREER project to solve various longstanding and pressing sustainability challenges. Dr. Jiang also collaborates extensively with faculty members in other quantitative fields. GRAs will benefit from these collaborations via joint mentorship and co-advising.

- USF is located in the safe, inclusive, and vibrant urban area in Tampa, Florida. **Each GRA will receive an annual stipend of \$30,000, plus full tuition waiver for graduate courses and coverage of health insurance.** Tampa is one of the fastest growing cities in the U.S. with lots of opportunities, natural beauty, fantastic scenery, and great convenience. USF is experiencing rapid growth across research, enrollment, and national rankings.
- We believe that actively participating and engaging in national and international conferences plays a vital role in exchanging research thoughts and progress, generating new ideas, and building strong professional networks across academia and industry. Therefore, we encourage our students to submit abstracts and give talks at related conferences, including AIChE Annual Meeting, INFORMS Annual Meeting, Process Systems Engineering Conference, etc. *In the past, each student would present at least one of the conferences each year.* **The group and USF will offer travel coverage on food, lodging, and transportation to each student attendee.**
- We value industrial experience and believe that it is beneficial to student's graduate research and long-term development. We encourage our students to seek and apply for summer internship opportunities in industry and national labs that will complement their research at CLAMS. *In the past, our students have gone for summer internships at large, multi-national cooperations.* **We will provide resources and support to help students succeed in their applications,** including writing letters of recommendation, hosting resume workshops, sharing interview insights and tips, conducting mock interviews, etc.

## QUALIFICATIONS

- Although the lab is housed in the School of Chemical Engineering, due to the multidisciplinary nature of our work, we welcome BS/MS candidates from a diverse pool, including mathematics, statistics, computer science, industrial engineering and operations research, mechanical and electrical engineering, and so on.
- Candidates should have a strong quantitative background and solid understanding of calculus/real analysis, linear algebra, probability/statistics. They should be comfortable with mathematical reasoning, such as performing mathematical derivations, writing proofs, coding, and conducting numerical experiments.
- We are looking for candidates who demonstrate self-motivation and commitment toward PhD study as well as strong enthusiasm for learning new topics in mathematical modeling, optimization, AI, machine learning, and optimal control.
- Good familiarity in one or more scientific computing software packages and programming languages (e.g., MATLAB, Python, Julia, GAMS, Pyomo), open-source machine learning frameworks (e.g., PyTorch), and agentic AI/LLM.



- Meet USF and Department of Chemical, Biological and Materials Engineering's PhD program admission criteria, including English proficiency requirements. For details, see <https://www.usf.edu/engineering/chbme/graduate/admissions.aspx>
- Desired (but NOT required) background: numerical partial differential equations, optimization, AI for Math/Science, optimal control, operator learning.

## **HOW TO APPLY**

Interested candidates can directly contact Prof. Zheyu Jiang at [zheyu.jiang@okstate.edu](mailto:zheyu.jiang@okstate.edu) with their latest CV and transcript(s) attached. A short written assessment about the candidate's quantitative skills may be sent via email to candidates who successfully pass the CV screening stage. Upon receipt of the written assessment, candidates will have 48 hours to complete it and to scan and email their answers back. Prof. Jiang may then schedule one or two rounds of virtual interviews with the qualified candidates before final decisions are made. Applications will be accepted on a rolling basis until the position is filled.

We understand that graduate program application can be a long and arduous experience, which mostly comes from the uncertainty and frustration during waiting. Therefore, we strive to make our interview process as fast and transparent as possible. We offer timely application status update to each candidate to minimize waiting time.

## **OUR COMMITMENT**

CLAMS adhere to a policy that prohibits discrimination on the basis of race, color, sex, sexual orientation, gender identity, religion, creed, national or ethnic origin, citizenship status, age, disability, veteran status, or any other legally protected class. We highly value diversity and seeks talented students from diverse backgrounds.