

BCSP 2026 PhD Studentships

Computational Gastronomy for Sustainable Protein Recipe Innovation

BCSP 2026 PhD Studentship · Dr Jakub Radzikowski

PhD Program Overview

The Bezos Centre for Sustainable Protein at Imperial College London, in collaboration with the Chemical Kitchen, the Dyson School of Design Engineering and the Department of Computing, is offering a fully funded PhD opportunity focused on computational gastronomy for sustainable protein recipe innovation. The transition to sustainable proteins is one of the most pressing challenges in global food systems; novel ingredients are nutritionally and environmentally compelling but struggle to find a home on the plate, and the barrier is cultural. Current computational gastronomy models rely on co-occurrence statistics from recipe corpora, which novel proteins simply do not have. This project asks not whether sustainable proteins can infiltrate iconic dishes, but whether new dishes can be generated that feel as though they always existed. The student will train a multimodal embedding model integrating flavour chemistry, sensory measurement, functional behaviour, cooking methods, nutritional composition, and other food metrics, creating a predictive framework for integrating ingredients with no culinary history into the food system. The project is supported by an industrial collaboration with KAIKAKU, including a 6-month embedded placement in Year 3.

Bezos Centre for Sustainable Protein Doctoral Program

This PhD program is part of the **Bezos Centre for Sustainable Protein's** broader initiative to advance knowledge and accelerate innovation in sustainable proteins, to make the food system more sustainable, equitable, resilient, efficient and healthy. The centre will do this through five pillars of work, namely research, translation, education, network and advocacy.

Research Focus

This interdisciplinary PhD will combine perspectives from machine learning, flavour chemistry, sensory science, and culinary practice to explore key themes such as:

- **Multimodal embedding architecture:** designing and training a heterogeneous graph neural network (Metapath2Vec, GAT, HAN, HGT) integrating four or more non-co-occurrence pathways: typed flavour chemistry, ISO 11036 sensory measurement, functional and process behaviour, and USDA-grade nutritional composition.
- **Cold-start for novel proteins:** developing methods to localise sustainable proteins with no culinary history in cuisine-specific embedding space, using rich-data about ingredients and a curated novel-protein library.
- **Chef-measured sensory benchmark:** building the first open chef-measured sensory dataset for sustainable proteins under ISO 11036 in Imperial's Chemical Kitchen, with inter-rater reliability assessed across professional chefs.

- **Real-world deployment and pop-ups:** deploying the trained model into KAIKAKU.AI's production Epicure system during the Year-3 placement, with a held-out user study with 20+ professional chefs, and four restaurant pop-ups demonstrating culturally distinct applications.

Supervisory Team

- **Principal Investigator:** Jakub Radzikowski, Chemistry / Chemical Kitchen, Imperial College London
- **Co-supervisor:** Elena Dieckmann, Dyson School of Design Engineering, Imperial College London
- **Co-supervisor:** Chiraag Lala, Department of Computing, Imperial College London
- **Industry supervisor:** Jakub Radzikowski, Chief Science Officer, KAIKAKU.AI Limited and Josef Chen, Chief Executive Officer, KAIKAKU.AI Limited.

Program Details

- **Funding:** Fully funded for UK home students
- **Location:** The research will be based at the Bezos Centre for Sustainable Protein and the Chemical Kitchen at Imperial College London, with a 6-month embedded placement at KAIKAKU.AI in Year 3

How This PhD Will Contribute

This project sits at the intersection of machine learning, flavour science, and culinary practice. By compressing the time-cost of culturally credible reformulation, the student will give alternative-protein producers a tool for a priori market-fit assessment by cuisine, currently missing from go-to-market; provide first-class computational support for Latin American, South Asian and East Asian cuisines, where research output is markedly thinner than in Western markets; and decouple sustainable-protein adoption from the slow co-occurrence accumulation that today dooms novel ingredients to peripheral-node status. Outputs (model weights, training data, the chef-measured sensory benchmark, and a queryable web interface for chefs and culinary students) will be released open-access. This work will directly support the Bezos Centre's mission to build a sustainable, equitable, resilient, and healthy food system.

Your Profile

We are looking for an enthusiastic and highly motivated PhD candidate with:

- A strong quantitative background in machine learning, computer science, computational biology, or applied mathematics
- A demonstrable interest in food, cooking, or sensory science
- Prior experience with graph neural networks, contrastive learning, or representation learning (essential)
- Specific technical skills: Python, PyTorch, modern embedding methods, heterogeneous graph models, statistical validation (cross-validation, bootstrap)
- Comfort designing experimental protocols and running chef-led sensory trials
- Comfort working at the boundary of structured ML rigour and creative culinary practice