

KEVIN HUDNALL

PHD CANDIDATE, BIOSYSTEMS ENGINEERING

ORCID: 0000-0003-3513-348X | Scopus Author ID: 57212243051 | kevinhudnall.com

(619) 370-0199

Davis, CA

kahudnall@ucdavis.edu

EDUCATION

University of California, Davis

Ph.D. in Biological Systems Engineering

Expected June 2026

Advisor: Raissa D'Souza

Thesis: *The Living Tree of Life and the Physics of Motion*

Synopsis: Mathematically modeled the dynamic tree of life and employed multifractal analysis and information theory to derive novel equations that link biological evolution to special relativity.

University of California, Davis

M.S. in Biological Systems Engineering

June 2019

Advisor: Tina Jeoh

Thesis: *Cross-linking of polymannuronate during spray-drying to form microcapsules*

Synopsis: Developed experimentally backed molecular dynamics simulations that informed how carbohydrates interact during microcapsule formation.

University of California, Davis

B.S. in Biological Systems Engineering with honors
Minor in mathematics

June 2017

University of California, Berkeley

B.A. in Philosophy and Anthropology (double major) with distinction

May 2010

RESEARCH EMPLOYMENT

2019 – 2020

Graduate Student Researcher

Biological Systems Engineering – UC Davis

Details: Mathematical and computer modeling of heat and mass transfer through leaf stomata.

Summer 2019

Graduate Student Researcher

Horticulture Innovation Lab – UC Davis

Details: Coordinated agricultural projects between UC Davis graduate students and African host countries.

2017 – 2018

Graduate Student Researcher

Biological Systems Engineering – UC Davis

Details: Microencapsulation via alginate cross-linking; gas chromatography; particle sizing; spray-drying; study of microcapsule release properties in simulated gastrointestinal fluids.

2015 – 2017	Undergraduate Research Assistant Biological Systems Engineering – UC Davis Details: Compositional analysis of agricultural waste products; bioconversion; HPLC.
2015 – 2016	Undergraduate Research Assistant Plant Pathology – UC Davis Details: Researched phytophthora as a pathogen to walnut and almond root stock; media preparation; plating fungal samples; DNA extractions; PCR; greenhouse bioassay management.
2010 – 2011	Undergraduate Research Assistant Environmental Science, Policy, and Management – UC Berkeley Details: Researched movement patterns of populations of navel orange worm in the California Central Valley; experiment set up; field data collection; maintained lab insect colonies; pest damage inspection.

TEACHING EMPLOYMENT

Guest lecturer - ECS 132 Prob. & Stat. Modeling for Comp. Sci. (Junior level)	Spring 24
Guest lecturer – ECS 253 Network Theory (Grad level)	Spring 25
TA – ECS 253 Network Theory (Grad level)	Spring 25
TA - EBS 127 Mass Transfer & Reaction Kinetics (Senior level)	Fall 18, 19, 21, 24
TA - EBS 75 Property of Materials in Biosystems (Sophomore level)	Winter 18, 19, 22, 23, 24
TA - EBS 125 Heat Transfer (Junior level)	Spring 19, 22, 23, 24, 25
TA - EBS 265 Design & Analysis of Engineering Experiments (Grad level)	Spring 23
TA - ENG 3 Introduction to Engineering Design (Freshman level)	Winter 19, Spring 20
TA - EBS 170A, B, C Senior Engineering Design (Senior level)	Fall, Winter, Spring 20 - 21
TA - EBS 1 Foundations of Biosystems Engineering (Freshman level)	Fall 22, 23
Reader - ABT 15 Applied Biosystems Technology (Sophomore level)	Winter 17

PUBLICATIONS

Published

Hudnall, K. and D’Souza, R. M. (2025) *What does the tree of life look like as it grows? Evolution and the multifractality of time.* Journal of Theoretical Biology, 582, 112121.
<https://doi.org/10.1016/j.jtbi.2025.112121>

Hudnall, K. *Information and the living tree of life: A theory of measurement grounded in biology.* BioSystems, 258, 105610. <https://doi.org/10.1016/j.biosystems.2025.105610>

Jeoh, T., Wong, D. E., Strobel, S. A., **Hudnall, K.**, Pereira, N. R., Williams, K. A., Arbaugh, B. M., Cunniffe, J. C., & Scher, H. B. (2021). *How alginate properties influence in situ internal gelation in crosslinked alginate microcapsules (CLAMs) formed by spray drying.* PLOS ONE, 16(2), e0247171.

Strobel, S. A., **Hudnall, K.**, Arbaugh, B., Cunniffe, J. C., Scher, H. B., & Jeoh, T. (2020). *Stability of Fish Oil in Calcium Alginate Microcapsules Cross-Linked by In Situ Internal Gelation During Spray Drying.* Food and Bioprocess Technology, 13(2), 275-287.

Under Review

Hudnall, K. *Multifractality in the tree of life: A Branching-Process RIFS Proof*. Journal of Mathematical Biology. (Under review). Preprint: [arXiv:2509.26637](https://arxiv.org/abs/2509.26637)

In preparation

Hudnall, K. *Individuality and the living tree of life: A mathematical theory of form*.

Hudnall, K. *The living tree of life and the physics of motion: First steps in biokinematics*.

Hudnall, K. *On the biological origin of time: Dimensional analysis and consistency with science*

TALKS GIVEN

Biological and Agricultural Engineering Seminar Series, UC Davis
Title: *The living tree of life and the physics of motion* October 16, 2024

UC Davis Math Department Student-Run Research Seminar
Title: *What does the tree of life look like as it grows?* May 10, 2023

California Research Alliance by BASF
Title: Formation of Spray-Dried Cross-Linked Alginate Microcapsules (CLAMs) April 23, 2018

HONORS AND AWARDS

Jastro-Shields Graduate Research Scholarship 2017, 2018, 2019, 2020, 2021

UC Davis College of Engineering Graduate Student Teaching Award 2022, 2023

PROJECTS

Recent projects can be found at my GitHub: <https://github.com/KevinAndrewHudnall>.