KEVIN HUDNALL

PHD CANDIDATE, BIOSYSTEMS ENGINEERING

(619) 370-0199
kahudnall@ucdavis.edu
Davis, CA

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 — June 2017
Minor in mathematics

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 product; 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

Hudnall, K. and D'Souza, R. M. *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. (Under review).

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

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

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.

TALKS GIVEN

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

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

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

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.