


# Clay Swackhamer CV

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## EDUCATION

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### University of California, Davis

*Enrolled Fall 2016*

Davis, CA

The College of Engineering

Ph.D. candidate in Biological Systems Engineering

Specialization: Food Engineering

Minor: Modeling and Control of Biological Systems

GPA: 3.94

### Penn State University

*Class of 2015*

University Park, PA

Schreyer Honors College, The College of Engineering

Bachelor of Science in Biological Engineering

Specialization: Food and Biological Process

Minor: Spanish

GPA: 3.92

### University of Alicante

*Fall 2014*

Semester abroad in Alicante, Spain

Completed 15 credits taught in Spanish, including a microbiology course with a laboratory

GPA: 4.00

## PEER-REVIEWED PUBLICATIONS

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1. **C. Swackhamer**, R. Doan, G. Bornhorst. "Development and characterization of standardized model, solid foods with varying breakdown rates during gastric digestion." Submitted to Food Hydrocolloids.
2. A. Hayes, F. Gozzi, A. Diatta, T. Gorissen, **C. Swackhamer**, S. Bellmann, B. Hamaker, "Some pearl millet-based foods promote satiety or reduce glycaemic response in a crossover trial." 2020. British Journal of Nutrition. doi: [10.1017/S0007114520005036](https://doi.org/10.1017/S0007114520005036).
3. N. Nativ-Zeltzer, R. Ueha, Y. Nachalon, B. Ma, G. Pastenkos, **C. Swackhamer**, G. Bornhorst, M.A. Lefton-Greif, J.D. Anderson, P.C. Belafsky. "Inflammatory Effects of Thickened Water on the Lungs in a Murine Model of Recurrent Aspiration." 2020. The Laryngoscope. doi: [10.1002/lary.28948](https://doi.org/10.1002/lary.28948).
4. A. Hayes, **C. Swackhamer**, Y. Mennah-Govela, M. Martínez, A. Diatta, G. Bornhorst. B. Hamaker. "Pearl millet (*Pennisetum glaucum*) couscous breaks down faster than wheat couscous in the Human Gastric Simulator, though has slower starch hydrolysis." 2020. Food & Function. 11: 111-122. doi: [10.1039/C9FO01461F](https://doi.org/10.1039/C9FO01461F). **Selected as cover article.**
5. **C. Swackhamer**, Z. Zhang, A.Y. Taha, G. Bornhorst. "Fatty acid bioaccessibility and structural breakdown from in vitro digestion of almond particles." 2019. Food & Function. 10: 5174-5187. doi: [10.1039/C9FO00789J](https://doi.org/10.1039/C9FO00789J)
6. **C. Swackhamer**, G. Bornhorst. "Fracture properties of foods: Experimental considerations and applications to mastication." 2019. Journal of Food Engineering. 263: 213-226. doi: [10.1016/j.jfoodeng.2019.07.002](https://doi.org/10.1016/j.jfoodeng.2019.07.002)

7. D. Ciolkosz, R. Hilton, **C. Swackhamer**, H. Yi, V. Puri, D. Swomley, G. Roth, "Farm-scale biomass pelletizer performance for switchgrass pellet production." 2015. Applied Engineering in Agriculture. 31(4): 559-567. doi: [10.13031/aea.31.10803](https://doi.org/10.13031/aea.31.10803)

## INDUSTRY EXPERIENCE

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### Engineering intern

*Winter-Summer 2016*

LignoLink, INC.

Innovation Park, PA

- Conducted aqueous ammonia pretreatment and enzymatic hydrolysis reactions on 98 biomass samples (corn stover)
- Designed, constructed, and validated in-house High Performance Liquid Chromatography (HPLC) assay for 5 sugar monomers in hydrolyzed biomass samples
- HPLC development included equipment purchase, installation, calibration, and development of automated data analysis routine using MATLAB
- Created the first logo and website for a faculty-led startup company, funded by the National Science Foundation-Small Business Innovation Research (NSF-SBIR) program

### Engineering intern

*Summer 2015*

McCormick & Company INC, Materials Process Engineering Group

Hunt Valley, MD

- Helped create plan to realize \$160,000 annual cost savings by eliminating overblending and reducing overfill losses
- Benchmarked physical properties of dry seasoning mixes (gravy mixes, taco seasoning, steak seasonings) using 5 instruments in food powder technology platform
- Conducted over 300 experiments, mostly involving powder flowability and compaction properties; processed data using descriptive statistics and modeling
- Quantified link between blend time and product bulk density
- Collaborated with McCormick engineers in 3 countries

## TEACHING EXPERIENCE

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### Teaching assistant

*Spring 2019, Fall 2019, Winter 2020, Spring 2020, Fall 2020, Winter 2021*

Course ENG 003: Intro to Engineering Design

UC Davis College of Engineering

- Responsible for two lab sections every academic quarter
- I've been a TA for this class 6 times, working with about 250 students in total
- Taught basics of circuit building using Arduino and Raspberry Pi
- Topics included circuit prototyping on breadboards, writing Arduino code, interfacing with analog devices, and troubleshooting circuits using a multimeter
- Specific circuits constructed include voltage dividers, temperature, light, moisture, humidity, and carbon dioxide sensors, running servo motors, taking photographs with a Raspberry Pi camera
- Taught engineering communication topics including team communication, goal setting, and effective presentation techniques
- Supported 72 original design projects made by students, which have included:
  - digital task management apps
  - precision irrigation monitoring systems
  - devices to sort potatoes by size
  - wearable electronics to quantify sun exposure of agricultural workers
  - devices to estimate grape ripeness for harvest planning

- emissions sensors for tractors
- facemask sanitization devices
- digital assistants to encourage hand-washing
- thermal sensing devices to automatically turn off an oven that was mistakenly left “on”
- motivational desktop-devices that display photos of loved ones/inspirational quotes
- mobility assist devices (canes and walkers) that track distance covered toward exercise goals
- multiplayer digital memory games that could help to keep mental and tactile skills sharp

### Teaching assistant

*Fall 2018*

Course EBS 001: Foundations of Biological Systems Engineering  
UC Davis Department of Biological and Agricultural Engineering

- Provided detailed written feedback for 49 students on homeworks and exams
- Held weekly office hours
- Supervised construction of seven algae photobioreactors and seven solar food dehydrators made by student teams for a final project

### Teaching intern

*Fall 2015*

Course BE 301: Mathematical Modeling of Biological and Physical Systems  
Penn State Department of Agricultural and Biological Engineering

- Teaching intern for course BE 301: Mathematical Modeling of Biological and Physical Systems (approximately 20 students)
- Held weekly office hours
- Ran review sessions and helped troubleshoot student MATLAB codes

## PRESENTATIONS

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1. **C. Swackhamer**, S. Keppler, A. Poltorak, T.F. Bedane, K. Cheung, N. Awais, F. Marra, G. Bornhorst. “Video analysis and computational fluid dynamic modeling of a novel multi-module peristaltic simulator for gastrointestinal research.” Remote/virtual poster presentation. Institute of Food Technologists Conference. **Won first place in Food Engineering Division graduate student research poster competition.** *July 2020.*
2. **C. Swackhamer**, R. Doan\*, G. Bornhorst. “Development and characterization of standardized model, solid foods with varying breakdown rates during gastric digestion.” Remote/virtual poster presentation. Institute of Food Technologists Conference. *July 2020.*
3. Z. Fu\*, **C. Swackhamer**, G. Bornhorst. “Effect of simulated gastric juice on texture change of almond particles during simulated gastric digestion.” Poster Presentation. UC Davis Undergraduate Research Conference. Davis, CA, *April 2019.*
4. **C. Swackhamer**, Z. Zhang, A. Taha, G. Bornhorst. “Fatty acid bioaccessibility, structural breakdown, and properties of digesta from in vitro digestion of almond particles.” Poster Presentation. Conference of Food Engineering. Minneapolis, MN, *September 2018.*
5. A. Hayes, **C. Swackhamer**, M. Martínez, Y. Mennah-Govela, G. Bornhorst, B. Hamaker. “Breakdown rate of couscous made from pearl millet versus wheat in a simulated gastric environment linked to gastric emptying.” Poster Presentation. Institute of Food Technologists Conference. Chicago, IL, *July 2018.*
6. X. Cao\*, **C. Swackhamer**, G. Bornhorst. “Experimental investigation of the impact of processing variables on fracture properties of almonds.” Poster Presentation. UC Davis Undergraduate Research Conference. Davis, CA, *April 2018.*

7. A. Hayes, **C. Swackhamer**, M. Martínez, Y. Mennah-Govela, G. Bornhorst, B. Hamaker. “Insights to the delayed gastric emptying rate and slow digestibility of pearl millet couscous.” Poster Presentation. Sorghum in the 21st Century. Cape Town, South Africa, *April 2018*.
8. A. Olenskyj, Y. Mennah-Govela, **C. Swackhamer**, K. Rios-Villa, G. Bornhorst. “Softening half-time and final normalized hardness as indicators of food structural breakdown during in vitro digestion.” Poster Presentation. Institute of Food Technologists Conference. Las Vegas, NV, *June 2017*.
9. **C. Swackhamer**, Y. Mennah-Govela, G. Bornhorst. “Physical property changes in soaked and activated almonds.” Poster Presentation. Almond Board of California Conference. Sacramento, CA, *December 2016*.
10. **C. Swackhamer**. “Effect of codon optimization on bacterial translation elongation rates.” Presentation. Penn State Department of Agricultural and Biological Engineering Department seminar: Exit seminar for undergraduate honors thesis presentation. University Park, PA, *December 2015*.
11. **C. Swackhamer**, “Industrial batch fermentation of L-Lysine using *Corynebacterium glutamicum*.” Presentation. Northeast Agricultural and Biological Engineering Conference (ASABE regional conference), Newark, DE, *July 2015*.
12. **C. Swackhamer**, A. Smith, E. Sileo, S. Krug, “Next-generation approaches to overcome the challenges of metabolic pathway engineering.” Presentation. iGEM Giant Jamboree, Boston, MA, *October 2014*.
13. **C. Swackhamer**, B. Wright, “Small scale densification of *Panicum virgatum* through pelletization.” Poster Presentation. Northeast Agricultural and Biological Engineering Conference (NABEC), Altoona, PA, *July 2013*.
14. **C. Swackhamer**, B. Wright, “Small scale densification of *Panicum virgatum* through pelletization.” Poster Presentation. Penn State Undergraduate Research Exposition, University Park, PA, *April 2013*.
15. **C. Swackhamer**, V. Vadyak, N. Vitacco. A. Alsuwaidi, “Portable recharging system for personal electronic devices.” Poster Presentation. Penn State Engineering Design Showcase, University Park, PA, *December 2012*.

\* indicates undergraduate student mentored

## AWARDS

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1. **Best teaching assistant award 2020**. Department of Biological and Agricultural Engineering, UC Davis College of Engineering. *2020*.
2. **First place in graduate student research poster competition**. Food Engineering Division. Institute of Food Technologists Conference. *July 2020*.
3. **UC Davis Graduate Student Travel Award \$500** *May 2020*.
4. **Biological Systems Engineering Graduate Program Fellowship Award \$2,000** *May 2020*.
5. **Walter Rosenberg Research Fund** to support the research of PhD candidates in Biological and Agricultural engineering, based on faculty nomination \$2,000 *May 2020*.
6. **John C. Harper Memorial Fellowship** for graduate students in Biological Systems Engineering specializing in Food Engineering, based on faculty nomination \$3,500, *November 2019*.
7. **UC Davis Jastro-Shields Fellowship** for graduate students in agricultural or environmental sciences based on competitive application \$2,500, *July 2019*.

8. **UC Davis Jastro-Shields Fellowship** for graduate students in agricultural or environmental sciences based on competitive application \$2,000, *October 2018*.
9. **UC Davis Jastro-Shields Fellowship** for graduate students in agricultural or environmental sciences based on competitive application \$1,700, *October 2017*.
10. **UC Davis Mentoring at Critical Transitions Award** for graduate students based on competitive application and potential to transition to future role as mentor, \$3,000, *September 2017*.
11. **UC Davis Scholars Award** first year fellowship for outstanding graduate students at UC Davis, \$58,000, *September 2016*.
12. **Outstanding Senior Award** in Penn State Department of Biological and Agricultural Engineering, *May 2016*.
13. **First place** in undergraduate paper competition for presentation of “Industrial Batch Fermentation of L-Lysine using *Corynebacterium glutamicum*,” Northeast Agricultural and Biological Engineering Conference (NABEC), *July 2015*.
14. **Gold medal** for team presentation of “Next-Generation Approaches to Overcome the Challenges of Metabolic Pathway Engineering,” iGEM Giant Jamboree, *October 2014*.
15. **Myriant Corporation Scholarship** for Excellence in Bioenergy, *October 2013*.
16. **Third place award** in engineering division for poster presentation of “Small Scale Densification of *Panicum virgatum* through Pelletization,” Penn State Undergraduate Research Exposition, *April 2013*.
17. **“Best in class” award** for poster presentation of “Portable Recharging System for Personal Electronic Devices,” Penn State Engineering Design Showcase, *December 2012*.

## CERTIFICATIONS

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1. **Social and Behavioral Research Best Practices for Clinical Research.** Three hour course with quiz and certificate, developed by the Collaborative Institutional Training Initiative (CITI). *2020*.
2. **Social and Behavioral Science Responsible Conduct of Research.** Three hour course with quiz and certificate, developed by the Collaborative Institutional Training Initiative (CITI). *2020*.
3. **Proposal Writing Program: Writing Successful Grant Proposals.** Five hour professional development program with quiz and certificate, developed by the American Association for the Advancement of Science (AAAS). *2017*.
4. **Synthetic biology certificate for undergraduates,** Synthetic Biology Engineering Research Center (SYNBERC). *2015*.
5. **Laboratory safety fundamentals** certificate, UC Davis Safety Services. *2016-present*.
6. **Passed Fundamentals of Engineering Exam** (FE-general disciplines). Certified engineer in Training (EIT), license number ET021732. *2015-present*.

## PROFESSIONAL AFFILIATIONS AND LEADERSHIP

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1. **Member,** Sigma Xi, The Scientific Research Honor Society (*2020-present*)
2. **Representative for UC Davis General Graduate Student Association,** Biological Engineering Graduate Student Association, UC Davis (*2019-2020*)
3. **Secretary,** Biological Engineering Graduate Student Association, UC Davis (*2018*)

4. **Member**, Society of Food Engineering (SoFE) *(2018-present)*
5. **Alumni Relations Co-Chair**, Biological Engineering Graduate Student Association, UC Davis *(2017)*
6. **Laboratory Safety Officer**, Food Engineering Laboratory, UC Davis *(Spring 2017, Spring 2019)*
7. **Member**, Institute of Food Technologists (IFT) *(2016-present)*
8. **Treasurer**, Alpha Epsilon, Honors Society of Biological Engineering, Penn State chapter *(2015)*
9. **Alumni Relations Chair**, Alpha Gamma Rho National Agricultural Sciences Fraternity *(2013-2014)*
10. **Financial Chair**, Penn State Agricultural Sciences Student Council *(2013-2014)*
11. **Member**, American Society of Agricultural and Biological Engineers *(2013-present)*
12. **Member**, Gamma Sigma Delta, National Honors Society in Agriculture *(2013-present)*