

## Stacy K. Firth

Department of Chemical Engineering  
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### EDUCATION:

- Ph.D. in Chemical Engineering, University of Texas (Austin) *December 2002*  
Dissertation Title: *Just-in-time Adaptive Disturbance Estimation for Run-to-Run Control in Semiconductor Processes*  
Dissertation Advisor: Dr. Thomas F. Edgar
- M.S. in Chemical Engineering, University of Utah *August 1998*  
Thesis Title: *On-line Estimation of Reid Vapor Pressure of a Distillation Product Based on Sparse and Unsynchronized Data*  
Thesis Advisor: Dr. Mikhail Skliar
- B.S. in Chemical Engineering, University of Utah *August 1995*

### WORK EXPERIENCE:

- Assistant Professor (Lecturer) *Jan. 2020 – Present*  
Department of Chemical Engineering, University of Utah, *Salt Lake City, UT*
- Associate Instructor *2015 – 2019*  
Department of Chemical Engineering, University of Utah, *Salt Lake City, UT*
- High School Engineering Program Coordinator *2013 – Present*  
College of Engineering, University of Utah, *Salt Lake City, UT*
- Research Associate *2009 – 2010*  
Colleges of Engineering, Science, and Education, University of Utah, *Salt Lake City, UT*
- Advanced Process Control (APC) Engineer *2001 – 2003*  
Yield Dynamics, Inc., *Austin, TX*
- Process Control Engineer Intern *2000 – 2001*  
KLA-Tencor, *Austin, TX*
- Process Control Engineer Intern *June – August 1999*  
Exxon Baytown Olefins Plant, *Baytown, TX*
- Air Quality and Pollution Prevention Engineer *1995 – 1997*  
CH2M HILL, *Salt Lake City, UT*

## **RESEARCH ACTIVITIES:**

- Developed an algorithm for use in error estimation and correction in run-to-run control as applied to semiconductor processing. The algorithm development led to two patents.

## **TEACHING ACTIVITIES:**

- Co-developing with Dr. Tony Butterfield a future Graduate course, Teaching Engineering, to be taught Spring Semester 2023.
- Teach Process Dynamics and Control, CH EN 4203, an introduction to process dynamics and control. Fall Semester 2015 – Present.
- Teach Projects Lab III, CH EN 4701, experimental and modeling studies of process control using bench-and pilot-scale equipment, programming tools, and simulation software. Designed new for Fall Semester 2021.
- Teach Chemical Engineering Design and Innovations Lab, CH EN 1705. Spring Semester 2020 - Present.
- Teach Survey of Engineering, ENGIN 1022. Fall Semester 2020 – Present.
- Lead instruction during College of Engineering Week for ACCESS Program Summer course, SCI 3000. Summer Semester 2018 – Present.
- Developed and teach EDU 5960, Engineering Workshop for Elementary/Secondary Educators, an engineering education professional development course for secondary science teachers with the purpose of integration of engineering principles as a part of the Utah Science with Engineering Education (SEEd) Standards. Course has been well received by participants. Summer 2021 – Present.
- Developed and continue to teach a professional development course for high school Career and Technical Education teachers who wish to obtain endorsement to teach Engineering Principles. Summer 2014 – Present.
- Developed curriculum, lesson plans, activities, documents, and videos for two courses: Engineering Principles and Engineering Capstone. Piloted courses during the 2013-2014, 2014-2015, and 2015-2016 school years. Course has since been adopted as a Utah State Board of Education core course in the Engineering Pathway and is taught in 49 high schools throughout Utah. Involvement in curriculum development is ongoing.
- Published course materials in textbook and on-line formats for use by teachers throughout the state of Utah. Update on-line materials in keeping with ongoing curriculum development.
- Motivated the addition of the developed courses as core courses in the Utah State Board of Education's Career and Technical Education Engineering Pathway.
- Assisted in writing state standards and skills tests for Engineering Principles now in use for this course in the state of Utah.

## **SERVICE ACTIVITIES:**

- Senator representing the College of Engineering, University of Utah Academic Senate, 2021-2024.
- Serve on the Senate Advisory Committee for Equity, Diversity, and Inclusion, 2022 – Present.
- Serve on the University Advisory Council for Teacher Educators.
- Co-advise the University of Utah student chapter of Society of Women Engineers.
- Co-advise the University of Utah Chemical Engineering Outreach organization.
- Serve on advisory board for College of Science ACCESS Program with responsibilities to identify and pursue sources for funding in order to expand the program.
- Serve on Department of Chemical Engineering Diversity, Equity, and Inclusion committee.
- Ambassador in STEM Ambassador Program Spring 2021 cohort. Created outreach project and activity for youth in custody at Farmington Bay Detention Center.

- Served as informal advisor for the continuing development for the new Center for Math and Science Education.
- Public School Volunteer: 2003 – Present, Help students improve skills in reading, mathematics, and science via one-on-one interaction and hands-on demonstrations and activities. Assist in organization and execution of fund raising events.

#### **AWARDS AND RECOGNITION:**

- Rated top 15% of instructor evaluations for CH EN 4203, 2017 and 2019.
- Awarded University of Utah’s Online Excellence Award for work to shift to online instruction in CH EN 1705, Spring 2020.

#### **PUBLICATIONS AND PRESENTATIONS:**

S. K. Firth, “Heat Exchanger Design – New Activity for Engineering Principles,” *Utah Technology and Engineering CTE Winter Conference*, St. George, UT, Feb. 2022.

S. K. Firth, “Materials Science of Chocolate – New Activity for Engineering Principles,” *Utah Technology and Engineering CTE Summer Conference*, Lehi, UT, June 2018.

S. K. Firth, “Engaging Under-represented Student Populations in Engineering,” *Utah Technology and Engineering CTE Summer Conference*, Ogden, UT, June 2017.

S. K. Firth, M. H. Watts, J. T. Byrom, “Engineering Principles Forum,” *Utah Technology and Engineering CTE Summer Conference*, Ogden, UT, June 2017.

S. K. Firth, M. H. Watts, “3<sup>rd</sup> Year Analysis of a Pre-Engineering Program for High School Students and Resources for Teachers,” *Utah Technology and Engineering CTE Summer Conference*, West Jordan, UT, June 2016.

S. K. Firth, M. H. Watts, “Teaching the New Engineering Design Capstone,” *Utah Technology and Engineering CTE Summer Conference*, West Jordan, UT, June 2016.

S. K. Firth, M. H. Watts, “Development and Analysis of a Pre-Engineering Program for High School Students,” *Utah Technology and Engineering CTE Summer Conference*, American Fork, UT, June 2015.

S. K. Firth, M. H. Watts, and S. D. Firth, “Development of a Pre-Engineering Program for High School Students,” *First Year Engineering Experience Conference*, College Station, TX, Aug. 2014.

S. K. Firth, W. J. Campbell, A. J. Toprac, and T. F. Edgar, “Just-in-time Adaptive Disturbance Estimation for Run-to-Run Control of Semiconductor Processes,” *IEEE Transactions on Semiconductor Manufacturing*, Vol. 19, Issue 3, Aug. 2006.

S. K. Firth, *Just-in-time Adaptive Disturbance Estimation for Run-to-Run Control in Semiconductor Processes*, Ph.D. Dissertation, University of Texas at Austin, 2002.

A. J. Toprac, W. J. Campbell, S. K. Firth, and T. F. Edgar, “Comparison of Run-to-Run Control Algorithms,” *ACC*, May 2002.

S. K. Firth, W. J. Campbell, and T. F. Edgar, “Just-in-time Adaptive Disturbance Estimation for Run-to-Run Control,” *Proc. 3<sup>rd</sup> European AEC/APC Conference*, Dresden, Germany, Apr. 2002. (Winner of the Student Paper Competition.)

S. K. Firth, W. J. Campbell, and T. F. Edgar, "Just-in-time Adaptive Disturbance Estimation for Run-to-Run Control of Photolithography Overlay," *SPIE*, Mar. 2002.

S. K. Firth and T. F. Edgar, "Just-in-time Adaptive Disturbance Estimation for Run-to-Run Control of Photolithography Overlay," *AIChE Conference*, Reno, NV, Nov. 2001.

S. K. Firth and W. J. Campbell, "Comparison of Run-to-Run Control Algorithms," *Proc. AEC/APC Symposium XIII*, Banff, Alberta, Canada, Oct. 2001.

S. K. Firth, *On-line Estimation of Reid Vapor Pressure of a Distillation Product Based on Sparse and Unsynchronized Data*, Master's Thesis, University of Utah, 1998.

S. K. Firth, et. al., "Pollution Prevention with MACT Compliance," *Annual Joint Services Pollution Prevention Conference*, San Antonio, TX, Aug. 1996.

#### **BOOK PUBLICATION:**

J. S. Bates, S. K. Firth, and M. H. Watts, *Survey of Engineering: A Guide to Choosing an Engineering Major: Textbook and Workbook*. Dubuque, IA: Kendall Hunt, 2014. eBook.

#### **PATENTS:**

**System and method for estimating error in a manufacturing process.** Patent No. 6,718,224

**System and method for controlling critical dimension in a semiconductor manufacturing process.**  
Patent No. 6,643,596