

TECHNICAL STRENGTHS

- Nuclear criticality safety analysis
- Monte Carlo and deterministic simulations of systems and experiments
- Mathematical and statistical modeling and software development
- Analysis of nuclear power generation, operation, and policy
- Developing and implementing quality assurance methodologies and procedures
- Teaching award-winning blended/hybrid university courses

PROFESSIONAL EXPERIENCE

Professor of Practice (Fall 2019-present) / Lecturer (2011-2019) / Clinical Associate Professor (2008-2011) / Adjunct (2001-2007) Department of Mechanical, Aerospace, and Nuclear Engineering (MANE), Rensselaer Polytechnic Institute

- multiple different courses taught to MANE and Core Engineering students
- world-wide best blended/hybrid course award winner (WebCT/Blackboard), 2007
- cross-disciplinary collaborations with HASS (DIS Program) and Folsom Library (bibliographic instruction)
- active mentor to students in nuclear engineering senior design and independent studies
- active in and passionate about new curriculum and new course development

Director, MANE Undergraduate Student Services, Rensselaer (2010-present)

- advise students on learning and life, particularly transfer, dual major, accelerated, and at-risk students in the department; ad hoc advisor to students from various departments
- active in promoting learning and teaching(e.g., visiting students days, outreach to local schools, Summer Bridge)
- develop department and inter-departmental curriculum policies and procedures; department scheduler; acting Degree Clearance Officer as needed

Consulting Curriculum Reviewer, Excelsior College, Outcomes Assessment & Institutional Research (2011-2014)

- Nuclear Engineering Technology – Integrated Technology Assessment review; 2011, 2013, 2014
- AS Technology Management – curriculum review; 2014
- AS Technology – curriculum review; 2012
- independent assessment of Written Communication VALUE Rubric used in capstone courses; 2011
- BS Technology – curriculum review; 2011

Expert Consultant, Mitsubishi Research Institute (2013, January-March)

- post-Fukushima collaborative survey of US nuclear safety analysis computer codes, with emphasis on severe accidents in light water reactors. (W. Zhou (PI), et al.)

Expert Consultant, U.S. Nuclear Regulatory Commission (2011 February - 2012 January)

- all-day presentation to NRC staff; favorable reception resulted in contract expansion
- 129 page report: *Boraflex, RACKLIFE, and BADGER: Description and Uncertainties*
- NUREG/CR-7129, released as Technical Report to speed timely access by industry

Nuclear Engineer, Northeast Technology Corp. (1985-2001, initially part-time)

- criticality safety analysis, material and neutronic characterization of neutron absorbers, radiation transport and energy deposition, spent fuel storage design, core refueling design, fuel thermal-mechanical analysis, thermal hydraulics, statistical and numerical analysis, software development
- RACKLIFE principle developer (25 kloc Fortran 95): tracks transport of silica contaminants in spent fuel pools based on the kinetics of silica dissolution from Boraflex, a degrading neutron absorber material
- principle analyst qualifying and evaluating measurements from BADGER: the Boron Areal Density Gauge for Evaluating Racks – an in-situ non-destructive diagnostic tool for measuring neutron absorber materials in nuclear fuel racks
- presentations to US and foreign nuclear regulatory authorities
- authored or participated in writing over a hundred technical reports for industry clients; authored reports and presented at EPRI workshops
- extensive use of Windows and Unix codes, including SCALE, MCNP, CASMO, NODE-P, FRAPCON, Microshield, and various Fortran compilers
- beta tester for commercial Fortran compiler widely used in the nuclear industry

Nuclear Engineering Intern, Westinghouse Electric Corp. (1983 May-August)

- unusually high level of responsibility and trust granted to do priority work
- participated in developing Recommended Operating Procedures for extended low power operations
- reload core design: core loading pattern, charge enrichment specifications for operating nuclear power plant
- translated technical documents from French to English

EDUCATION

Ph.D., Nuclear Science and Engineering, Rensselaer Polytechnic Institute, 2000

- concentrations in criticality safety, Monte Carlo methods, verification and validation
- thesis: *Improved Analysis of Bias in Monte Carlo Criticality Safety*. (Advisor: Don Harris)

M.S., Applied Mathematics, Rensselaer; 1992

- concentrations in modeling and numerical analysis: mechanical vibrations, chemical carcinogenesis, resurrecting novel numerical method for solving ODEs
- IBM Research Assistant mathematically modeling and analyzing mechanical vibrations in a high speed impact printer
- thesis: *The role of mathematical modeling in toxicology: a review in the context of chemical carcinogen regulation design.* (Advisor: Don Drew)

M.S., Environmental and Energy Engineering, Rensselaer; 1990

- concentration in energy policy and economics
- Institute of Nuclear Power Operations Fellowship
- Department of Energy Research Assistant: assessing models of two-phase flow
- thesis: *A characteristic analysis of mathematical models of two-phase flow in one space dimension.* (Co-Advisors: Dick Lahey and Don Drew)

B.S., Nuclear Engineering, Rensselaer; 1984

- minors in Mathematics and Philosophy
- independent studies:
 - *An analytical analysis of BWR stability*
 - *Engineering problems of lithium breeding in tokamak fusion reactor blankets*
- overloaded social science, humanities, seminar, and survey courses in various fields
- awarded Erwin R. Gaertner prize for “Outstanding Potential in Graduate Studies”
- senior project: *Nuclear Fuel Temperature Profiles.* (Advisor: Mike Podowski)

AWARDS

David M. Darrin Counseling Award, 2017

- for unusual contribution in the counseling of undergraduate students at Rensselaer Polytechnic Institute; selected by Phalanx student leadership honorary society

Greenhouse Exemplary Course Program Award, 2007

- best in world (according to WebCT / Blackboard), blended/hybrid course *Nuclear Phenomena for Engineering Applications* (with M-P. Huguet, course developer, and D. Steiner, content expert)

PUBLICATIONS AND PRESENTATIONS

Peer-Reviewed Publications

Vazquez, Justin A., Aiping Ding, **Thomas Haley**, Peter F. Caracappa, and X. George Xu. *A Dose-Reconstruction Study of the 1997 Sarov Criticality Accident Using Animated Dosimetry Techniques.* Health Physics Society Journal: Vol. 106, No. 5, pp. 571-582; May 2014.

Haley, Thomas C. *Boraflex, RACKLIFE, and BADGER: description and uncertainties.* Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission: Washington, D.C.; September 2012. (Was NUREG/CR-7129.) ADAMS Accession Number ML12216A307.

Haley, Thomas C. “Shoreham Nuclear Power Plant”, pp. 1411-1412, in The Encyclopedia of New York State, Peter Eisenstadt, editor in chief: Syracuse University Press; 2005.

Holmes, Colette O., D. Elizabeth Irish, and **Thomas C. Haley.** *BI for an undergraduate engineering course: an interactive model.* Research Strategies: Vol. 12, No. 2, pp. 115-121; Spring 1994. (Library Instruction Round Table “Top Twenty for 1994”.)

Haley, Thomas C., Richard. T. Lahey, Jr., and Donald. A. Drew. *A characteristic analysis of void waves using two-fluid models.* Nuclear Engineering and Design: Vol. 139, No. 1, pp. 45-57; January 1993.

Haley, Thomas C., Donald. A. Drew, and Richard. T. Lahey, Jr. *An analysis of the eigenvalues of bubbly two-phase flows.* Chemical Engineering Communications: Vol. 106, p. 93; 1991.

Lindquist, Kenneth O., Simon T. C. Hsieh, and **Thomas C. Haley.** *Benchmarking and modification of FRAPCON2 VIMOD5.* Transactions of the American Nuclear Society: Vol. 55, pp. 287-289; 1 January 1987.

Non-Proprietary Industry Publications

(Those with significant contribution, principal, or sole* authorship)

**Guidance and Recommended Procedures for Maintaining and Executing RACKLIFE Version 1.10 Models.* (By Northeast Technology Corp.) EPRI: Palo Alto, CA; December, 2001.

**RACKLIFE Version 1.10: Nuclear Spent Fuel Pool Boraflex Rack Life Extension Rack Management Tool – User's Manual.* EPRI: Palo Alto, California; March 2000.

LWR Plant Water Silica Database, Revision 4. EPRI: Palo Alto, California; February 2000.

The Surface Composition and Solubility of Irradiated Boraflex and Silica Treated in Metal Ion Solutions, EPRI Report TE-114126. EPRI: Palo Alto, California; November 1999.

The Boraflex Rack Life Extension Computer Code – RACKLIFE: Verification and Validation, EPRI Report TR-109926. EPRI: Palo Alto, California; March 1999.

The Performance of Irradiated Boraflex under Seismic Conditions, EPRI Report TR-109927. EPRI: Palo Alto, California; September 1998.

MCNP Validation of BADGER, EPRI Report GC-110539. EPRI: Palo Alto, California; May 1998.

A Synopsis of the Technology Developed to Address the Boraflex Degradation Issue, EPRI Report TR-108761. EPRI: Palo Alto, California; November 1997.

BADGER, a Probe for Nondestructive Testing of Residual Boron-10 Absorber Density in Spent-Fuel Storage Racks: Development and Demonstration, EPRI Report TR-107335. EPRI: Palo Alto, California; October 1997.

**The Boraflex Rack Life Extension Computer Code – RACKLIFE: Theory and Numerics*, EPRI Report TR-107333. EPRI: Palo Alto, California; September 1997.

Guidelines for Boraflex Use in Spent-Fuel Storage Racks, EPRI Report TR-103300. EPRI: Palo Alto, California; December 1993.

Boraflex Test Results and Evaluation, EPRI Report TR-101986. EPRI: Palo Alto, California; February 1993.

An Assessment of Boraflex Performance in Spent-Nuclear-Fuel Storage Racks, EPRI Report NP-6159. EPRI: Palo Alto, California; December 1988.

Haley, Tom, Asa Trainer, and Rolf Wentorf. *CADAM and EMAD-special*. IBM Grantee School Consortium Technical Reports, Volume 1; 1988.

Presentations

Haley, Thomas C. *A Perfect Storm of Blended Learning*. 10th Annual Rensselaer Colloquium on Teaching and Learning: Rensselaer Polytechnic Institute, Troy NY; 24 May 2010. [Invited.]

Haley, Thomas C., Emily Liu, and Wei Ji. *One Course, Three Professors, Five Semesters*. 10th Annual Rensselaer Colloquium on Teaching and Learning: Rensselaer Polytechnic Institute, Troy NY; 24 May 2010. [Invited.]

Caracappa, Peter F., Timothy Trumbull, **Thomas Haley**, Marie-Pierre Huguet, Wei Ji, Yaron Danon, Bryndol Sones, and Donald Gillich. *Making the Most of Hands-on Learning – an Integrated Course at Rensselaer*. Transactions of the American Nuclear Society, Vol. 103, pp. 124-125; 2010.

Haley, T., Y. Danon, T. Trumbull, P. Caracappa, W. Ji, M-P. Huguet, E. Blaine, B. Sones, and D. Gillich. *Nuclear Blenders: Blended Learning from Rensselaer's Reactor Critical Facility*. Technical Meeting on Low-Power Critical Facilities and Small Reactors: Ottawa, Ontario, Canada; 1-2 November 2010.

Huguet, Marie-Pierre, **Thomas Haley**, and Yaron Danon. *Hands-On Nuclear Engineering Education - A Blended Approach*. ASEE Annual Conference: Louisville, KY; 20-23 June 2010.

Huguet, Marie-Pierre, Frank Wright, and **Thomas C. Haley**. *Exemplary Courses, Exemplary Designs – A Tale of Three Faculty*. Society for Applied Learning Technology (SALT) 2009 Interactive Technologies Conference: Arlington, Virginia; 19-21 August 2009.

Huguet, Marie-Pierre, Frank Wright, and **Thomas C. Haley**. *Beyond The Template, an Award-Winning Design Approach for Blended and Online Courses*. 9th International Educational Technology Conference (IETC): Hacettepe University, Ankara, Turkey; 6-8 May 2009.

Liu, Li (Emily), Marie-Pierre Huguet, and **Thomas Haley**. *Work in Progress – SAGES: Podcast, Wikis and Emerging Technologies in the Engineering Classroom*. 38th ASEE/IEEE Frontiers in Education Conference: Saratoga Springs, New York; 22-25 October 2008.

Huguet, Marie-Pierre, **Thomas C. Haley**, and Frank Wright. *Exemplary Courses, Exemplary Designs – Templates vs. Standards*. BbWorld 2008 Conference: Las Vegas, Nevada; 15-17 July 2008.

Huguet, Marie-Pierre, **Thomas C. Haley**, and S. Baltaci-Goktalay. *From Electrons to Neutrons – Blended Engineering Education*. Engineering Education 21st Century Frontiers: American Society for Engineering Education Zone 1 Conference, United States Military Academy at West Point; 28-29 March 2008.

Huguet, Marie-Pierre, **Thomas Haley**, Chris Moore, and Don Steiner. *Yes, engineers can talk! Blended instruction in the engineering classroom*. 12th Sloan-C International Conference on Online Learning: Orlando, Florida; 8-10 November 2006.

Huguet, Marie-Pierre, Chris Moore, Frank Wright, and **Thomas Haley**. *Designing Faculty Workshops for the New Millennium – Walking the Talk*. 11th Sloan-C International Conference on Online Learning: Orlando, Florida; 17-19 November 2005.

Huguet, Marie-Pierre, Chris Moore, Roger Grice, **Thomas Haley**, Greg. Hughes, Carl McDaniel, Bill St. John, and Frank Wright. *Technology, Blended Learning, and RPI*. Sixth Annual Rensselaer Colloquium on Teaching and Learning: Troy, New York; 15-16 May 2006. [Invited.]

Huguet, Marie-Pierre, Chris Moore, Frank Wright, and **Thomas Haley**. *Designing Faculty Workshops, Blending Face-to-Face and WebCT Technologies*. WebCT !MPACT, San Fransico, California: July 2005.

Dieffenbach, Marie, and **Thomas C. Haley**. *How are You Deciding Your Future? Nuclear Engineering and Engineering Physics Session*. Rensselaer Polytechnic Institute's Engineering Discovery Week: Troy, New York; 2 October 2003. [Invited.]

Foley, William J., **Thomas Haley**, Burt Swersey, and Rolf Wentorf. *Use of an old technology in engineering design education: the design notebook*. ASEE St. Lawrence Section 1995 Conference; 1995.

Foley, William J., Doug Baxter, Ishwara Bhat, Thomas Crowley, Robert Degeneff, John Elias, **Thomas Haley**, Robert Kelley, Yannick LeCoz, Anthony Luscher, Larry Ruff, Arjun Saxena, Burt Swersey, Denniz Terry, Brian Thompson, and Rolf Wentorf. *Design, Build, and Test Projects for Engineering Design Education: Project Experience at Rensselaer*. ASEE St. Lawrence Section 1995 Conference; 1995.

Haley, Thomas C. *An analytical analysis of BWR stability*. Transactions of the ANS Eastern Regional Student Conference: Troy, New York; 3-5 April 1986.

Haley, Thomas C. *Engineering problems of lithium breeding in tokamak fusion reactor blankets*. Transactions of the ANS Eastern Regional Student Conference: Lowell, Massachusetts; 5-7 April 1984.

Patents

Lindquist, Kenneth O., and **Thomas C. Haley**. *Inhibition of silica dissolution in an aqueous environment*. Patent No. 5,867,549; 2 February 1999.

Movies

Everything you always wanted to know about Neutron Chain Reactions – but were afraid to ask. **Thomas C. Haley**, director, co-producer, and co-writer. Appropriate for engineering and technology undergraduates and advanced high school chemistry students: 50 minutes; 2010.

Hudson Exploring. **Thomas C. Haley**, producer, director, and writer. East Greenbush Community Library and Upper Hudson Library System celebration of the 400th anniversary of Henry Hudson's voyage up the Hudson River. Appropriate for all ages: 5 minutes; 2009.

TEACHING AND ADVISING

Diversity of Teaching

- 80 students in a *Thermal and Fluids Engineering I* lecture hall;
- 4 students in a small *Thermal and Fluids Engineering Lab* room;
- 23 sophomores in *Nuclear Phenomena for Engineering Applications* as a blended/hybrid course, winning Greenhouse Exemplary Course Program award as the best blended/hybrid course in the world that year;
- 78 first-year students in *Introduction to Engineering Analysis* as a studio course;
- 15 graduate students in *Nuclear Criticality Safety* as a part lecture / part experiential learning course;
- proficient in teaching multiple courses, from First-Year to advanced graduate level; for one course, *Monte Carlo for Engineers* – attracting a mix of aerospace,

mechanical, and nuclear engineering students – could find no equal taught regularly at any other top U.S. engineering school.

Diversity of Advising

- advise cohorts of four-year students, transfer students, dual-majors (standard and unusual), readmits, and at-risk students
- David M. Darrin counseling award winner, 2017
- craft new dual and double major templates, and paths to graduate programs
- collaborated with Registrar's office and Deans to standardize HASS Core and Science Core guidelines for transfer students

List of Seventeen Courses Taught at Rensselaer (Troy campus, as well as the “Malta Program” for full-time active duty Navy enlisted personnel pursuing a Rensselaer Nuclear Engineering degree)

ENGR-1100 Introduction to Engineering Analysis (Troy, Malta)

ENGR-2020 Design, Innovation, and Society Studio 3 (Troy – joint with STS/HASS)

ENGR-2050 Introduction to Engineering Design (Troy)

ENGR-2250 Thermal and Fluids Engineering I (Troy, Malta)

MANE-1960 Introduction to Engineering Computation (Troy)

MANE-2110 Numerical Methods and Programming for Engineers (Troy)

MANE-2830 Nuclear Phenomena for Engineering Applications (Troy, Malta)

MANE-4020 Thermal and Fluids Engineering Lab (Troy)

MANE-4450 Nuclear Fuel Management (Troy)

MANE-4470 Radiological Engineering (Troy)

MANE-4480 Physics of Nuclear Reactors (Malta)

MANE-4960 Nuclear Criticality Safety (Troy, Malta)

MANE-4960 Monte Carlo for Engineers (Troy)

MANE-6290 Radiation Transport Methods (Troy)

MANE-6300 Numerical Methods in Reactor Analysis (Troy)

MANE-6350 Radiation Shielding (Troy)

MANE-6810 Mathematical Applications in Nuclear Engineering & Engineering Physics (Troy)

ACADEMIC SERVICE

MANE Curriculum Support

- support curriculum development and course development for all MANE programs
- develop course enrollment models to predict faculty loads based on proposed curriculum changes
- initiate discussion groups and committees to discuss and develop new MANE curriculum initiatives and courses
- support MANE Curriculum Committee initiatives (e.g., MANE+X, computational initiatives, writing initiatives, design initiatives)
- develop study-abroad exchange plans

- develop dual and double major templates (MANE + Engineering; Science; Humanities, Arts, and Social Sciences; Lally School of Management; Information Technology and Web Science)
- support course and instructor scheduling
- support development of tenure-track teaching plans for new faculty
- project advisor for Nuclear Engineering Senior Design teams

SoE Curriculum and Advising Support

- interface with other schools (HASS, Science) to standardize policies, particularly for transfer students
- MANE support for SoE HUB training
- acting Degree Clearance Officer as needed

MANE Catalog and Scheduling Support

- review and update course offerings schedule and prerequisites; interface with registrar's office to coordinate enforcement
- schedule semester and summer courses in MANE and coordinate inter-department cross-listings and Core Engineering schedule via SSASECT database
- maintain MANE entries to Digital Measures compliance SSAATTD database
- support ARCH information / recruitment sessions at department and SoE level
- develop and maintain ARCH templates for MANE curricula

Institute Service

- support training of ALAC Teaching and Learning Assistants
- support Summer Bridge program
- active member of academic advising committee
- active member of assigned search committees

External Professional Activities

- mentor to Goff Middle School Science Olympiad teams
- video and labor support for Goff Middle School and Columbia High School theater groups
- Wentorf Foundation (charitable organization directed at education and forestry-related concerns) board member

APPENDIX A: TEACHING VISION

I approach my teaching at Rensselaer with the following vision.

To be a leader with global reach and global impact, Rensselaer engineering students must learn to collaborate with *multiple disciplines*, practice *multiple ways of thinking*, and solve problems in *multiple time scales*:

multiple disciplines

- mechanical, aeronautical, nuclear, biomedical, chemical, civil, computer, electrical, environmental, industrial, management, materials, systems,....
- engineering sciences, fundamental sciences, social sciences, management sciences, building sciences,....
- sciences, humanities, business, law,....

multiple ways of thinking

- modeling: geometric, mathematical, functional, operational, numerical, heuristic, proof-of-concept,....
- decision making: risks versus rewards, benefits versus consequences, critical choices, quantitative and qualitative....
- communication, learning, and teaching, in all their forms....
- theory and application, modeling and analysis, design and manufacture, development and diagnostics, systems/components/interfaces,....

multiple time scales – adapting to and designing for the rates of change in

- technology and innovation
- society, industry, and education
- cultures, economies, and institutions
- environment and resources

Even when teaching students outside of engineering – Science and Technology Studies, Sustainability Studies, Computer Science, Biology, Chemistry, Management, and Architecture, to name some that have been in my classes – I teach them as a student at a Polytechnic Institute given that they chose to embrace that perspective from the course I am teaching.

Thus, I do not teach a course in isolation, but as part of the continuum of their life-long learning process. I draw on what skills they bring to class from previous courses, and I prepare them to better engage with subsequent courses and subsequent employment, no matter what direction they choose to go.