Barry Lawson

Colony Family Professor of Digital & Computational Studies
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Scholarly Interests: Modeling & Simulation, Agent-Based Simulation, CS & STEM Education

Education

Ph.D. in Computer Science, College of William and Mary, 2002
M.S. in Computer Science, College of William and Mary, 1996
B.S. in Math & Computer Information Systems, University of Virginia's College at Wise, 1993

Employment History

Colony Family Professor of Digital & Computational Studies, Bates College, 2021 –

Visiting Professor of Digital & Computational Studies, Bates College, 2020 – 2021

Professor of Computer Science, University of Richmond, 2017 – 2021

Associate Professor of Computer Science, University of Richmond, 2008 – 2017

Assistant Professor of Computer Science, University of Richmond, 2002 – 2008

Adjunct Instructor of Computer Science, College of William and Mary, 2001 – 2002

Teaching Fellow, College of William and Mary, 1998 – 2001

Programmer, NASA Langley Research Center, Unisys Corporation, 1997 – 1998

Research Assistant, College of William and Mary, 1995 – 1996

Programmer, VA Department of Mines, Minerals, and Energy, 1991 – 1994

Teaching Activities

Undergraduate Courses Taught   (*: co-instructor;   underlined: taught at Bates College)

- DCS 109: Intro. to Computing & Programming
- DCS 211: Computing for Insight
- CMSC 105: Elementary Programming (CS0)
- CMSC 150: Intro. to Computing (CS1)
- CMSC 195: SMART CS (CS0.5)
- DCS 229, CMSC 221: Data Structures (CS2)
- CMSC 222: Discrete Structures
- CMSC 240: Software Systems Development
- CMSC 315: Algorithms
- CMSC 321: Operating Systems
- DCS 307, CMSC 326: Simulation
- DCS 360, CMSC 340: Independent Study (various)
- CMSC 395: Digital Image Processing
- BIOL/MATH 190*: Integrated Quantitative Science
- BIOL/CHEM 192*: Science, Math, & Research Training
- BIOL 351*: Bioinformatics
- FYS 505: First-Year Seminar

Selected Recent Undergraduate Research Supervised

- Rebecca Anderson: F2023, W2024. Dimensional exploration in sponge:algae agent-based modeling.
- Lucas Clement: W2021, F2022, W2023. Seasonal fluctuation in sponge:algae agent-based modeling.
- Vadim Kudlay: Su2019, S2020. Animation and visualization for the `simEd` package for R.
- Melissa Gu, Tracy Nguyen: F2019, S2020. Visualization for agent-based simulation models.
- Joel Tabappsi Fokwa, Natnael Asmelash: Su2019, F2019. Agent-based simulation of trade markets.
- Sara Camilli: F2018, S2019. Simulation of sponge:algae affinities.
- Shiv Toolsidass: S2018. Animation for simulation teaching concepts using R.
- Nasheya Rahman: S2018. Simulating pitch effectivness in entrepreneur/investor processes.
- Nasheya Rahman: F2016. Agent-based simulation of sponge:algae symbiotic relationships.
- Jackson Taylor: Honors in CS, 2015–2016. Translating sign language using wearable technology.
- Georgi Lekov: S2015, F2015, S2016. Group dynamics in swarm robot systems.

- Amy Shick: Su2014, F2014, S2015. A growth-mindset educational game to increase CS representation.
- Marie Fernandez: Su2014. Group dynamics in swarm robot systems.
- Andreea Iovan: F2013, S2014. Modeling antibiotic resistance in hospital wards.
- Taylor Applebaum, Erin Gibbons, Samantha Ostoich: F2013,S2014. Growth-mindset interventions in CS.
- Natalie Pollard, Jackson Taylor: Su2013. Investigating the consistent programmer hypothesis.
- Matt Der: Honors in CS, 2009–2010. Detecting malicious JavaScript.

<u>Teaching Awards & Honors</u>
- University of Richmond Distinguished Educator, 2014
- Mentor, Clarence J. Gray Achievement Award for Amy Shick (Robins School of Business), 2016

<u>Publications and Scholarly Activity</u>   (* undergraduate authors)

- M. Hill, B. Lawson, J.W. Cain, N. Rahman*, S. Toolsidass*, T. Wang*, S. Geraghty*, E. Raymundo*, and A. Hill. Sustained Beneficial Infections: Priority Effects, Competition, and Specialization Drive Patterns of Association in Intracellular Mutualisms. *Front. Ecol. Evol.* **11**:1221012, Dec 2023. doi: 10.3389/fevo.2023.1221012

- B. Lawson and L. Leemis. `simEd`: Simulation Education Package for R. The Comprehensive R Archive Network (CRAN), version 2.0.1 released Nov 2023 (version 1.0.x released May 2017). 16000 LOC, 135 pp. documentation.
  - Install in R via CRAN: `install.packages("simEd")`
  - Software source code on GitHub: https://github.com/cran/simEd

- S. Jones, A. Blake, L. Corado-Santiago, J. Crenshaw, E. Goldman, F. Gomez, C. Hall, H. Hoke, S. Holmes, B. Kornegay, P. Kwarteng, B. Lawson, M. Leber, G. Leconte, E. Modeste, K. Nolin, M. Norris, J.S. Roma, A. Swackhammer, M. Torres, J. Wares, D.E. Williams, A. Hill, K. Hoke, C. Parish, and B.D. Pierce. A SMART Decade: Outcomes of an Integrated, Inclusive, First-Year College-Level STEM Curricular Innovation. *Frontiers in Education*, Volume 8, July 2023. doi: 10.3389/feduc.2023.1152339

- B. Lawson, and L. Leemis. Structuring a Simulation Course Around the `simEd` Package for R. In *Proceedings of the 2021 Winter Simulation Conference* (WSC '21). IEEE Press, Article 269, 1–12. December 2021.

- V. Kudlay*, B. Lawson, and L. Leemis. Animation for Simulation Education in R. In *Proceedings of the 2020 Winter Simulation Conference*, (Virtual). December 2020.

- J. Burnette, C. Hoyt, M. Russell, B. Lawson, C. Dweck, and E. Finkel. A growth mind-set intervention improves interest but not academic performance in the field of computer science. *Social Psychological and Personality Science*. DOI: 10.1177/1948550619841631. April 2019.

- B. Lawson and L. Leemis. An R Package for Simulation Education. In *Proceedings of the 2017 Winter Simulation Conference*, Las Vegas, NV. December 2017.

- L. Caudill and B. Lawson. A Unified Inter-host and In-host Model of Antibiotic Resistance and Infection Spread in a Hospital Ward. *Journal of Theoretical Biology*, Vol. 421, pp. 112–126, May 2017. DOI: 10.1016/j.jtbi.2017.03.025.

- J. Wares, B. Lawson, D. Shemin, and E. D'Agata. Evaluating Infection Prevention Strategies in Out-Patient Dialysis Units Using Agent-Based Modeling. *PLOS ONE*, 11(5): e0153820, May 2016. DOI: 10.1371/journal.pone.0153820.

- M. Russell, J. Burnette, C. Hoyt, C. Dweck, E. Finkel, and B. Lawson. Growth Mindset Interventions Buffer Against the Decline in Students' Computer Science Interest Over Time (poster). In *Annual Meeting of the Society for Personality and Social Psychology (SPSP)*, San Diego, CA, January 2016.

- B. Lawson, M. Hill, A. Hill, T. Heist*, and C. Hughes*. An Agent-Based Simulation Model Of Sponge:Algae Symbiotic Relationships. In *Proceedings of the 2015 Winter Simulation Conference*, Huntington Beach, CA. December 2015.

- B. Lawson and L. Leemis. Discrete-Event Simulation Using R. In *Proceedings of the 2015 Winter Simulation Conference*, Huntington Beach, CA. December 2015.

- A. Shick*, B. Lawson, C. Hoyt, and J. Burnett. Increasing Female Involvement and Achievement in STEM (poster). In *2015 Grace Hopper Celebration of Women in Computing*. Houston, TX, October 2015.

- M. Russell, J. Burnette, C. Hoyt, C. Dweck, E. Finkel, and B. Lawson. The effects of a growth mindset intervention on students' computer science interest over time (poster). In *Annual Meeting of the Southeastern Society for Social Psychology (SSSP)*, Winston-Salem, NC, October 2015.

- A. Shick*, B. Lawson, C. Hoyt, J. Burnette. Ice Maze: A Growth-Mindset Game for Introductory Computer Science (poster). *CAPWIC 2015: Capital Region Celebration of Women in Computing*, Harrisonburg, VA, 27 February 2015. (Awarded top prize for undergraduate poster presentations.)

- J. Burnette, C. Hoyt, B. Lawson, and C. Dweck. Growth Theories Buffer Females Against Identity Threat in Computer Science. In *Annual Meeting of the Society for Personality and Social Psychology (SPSP)*. Long Beach, CA, February 2015.

- B. Lawson and L. Leemis. Introduction to Monte Carlo and Discrete-Event Simulation. *INFORMS Continuing Education Course for Analytics Professionals*. 2014. http://tinyurl.com/INFORMS-ContEd-MCDES

- L. Caudill and B. Lawson. A Hybrid Agent-Based and Differential Equations Model for Simulating Antibiotic Resistance in a Hospital Ward. In *Proc. of the 2013 Winter Simulation Conference*, Washington, DC, Dec 2013.

- B. Lawson, D. Szajda, and L. Barnett. Introducing Computer Science in an Integrated Science Course. In *Proceedings of the 44th ACM SIGCSE Technical Symposium*, Denver, CO, March 2013.

- L. Gentile, L. Caudill, M. Fetea, A. Hill, K. Hoke, B. Lawson, O. Lipan, M. Kerckhove, C. Parish, K. Stenger, and D. Szajda. Challenging Disciplinary Boundaries in the First Year: A New Introductory Integrated Science Course for STEM Majors. *Journal of College Science Teaching*. Vol. 41, No. 5, May 2012.

- B. Lawson and L. Leemis. Simulation Fundamentals. In *Proceedings of the 2009 Winter Simulation Conference*, pp. 239-247. Austin, TX. December 2009. (Invited)

- B. Lawson and L. Leemis. Monte Carlo and Discrete-Event Simulations in C and R. In *Proceedings of the 2008 Winter Simulation Conference*, pp. 11-16. Miami, FL. December 2008. (Invited)

- B. Lawson and L. Barnett. Using iPodLinux in an Introductory OS Course. In *Proceedings of the 39th ACM SIGCSE Technical Symposium*, Portland, OR, March 2008.

- B. Lawson and L. Leemis. Simulation 101 Software: Workshop and Beyond. In *Proceedings of the 2007 Winter Simulation Conference*, pp. 233-236. Washington, DC. December 2007. (Invited)

- D. Szajda, M. Pohl*, J. Owen, and B. Lawson. Toward a Practical Data Privacy Scheme for a Distributed Implementation of the Smith-Waterman Genome Sequence Comparison Algorithm. In *Proc. of the 2006 ISOC Network and Distributed System Security Symposium (NDSS 2006)*, San Diego, CA, February 2006.

- J. Owen, B. Lawson, and D. Szajda. A Nonparametric Analysis for Smith-Waterman Alignment Scores. In *Proc. of the AMA 2006 Joint Stat. Meetings*, Biometrics Section, pp. 315-320. August 2006. (Non-refereed)

- D. Szajda, B. Lawson, and J. Owen. Toward An Optimal Redundancy Strategy for Distributed Computations. In *Proc. of the 2005 IEEE Intl. Conf. on Cluster Computing (Cluster 2005)*, Boston, MA, Sept. 2005.

- B. Lawson, C. Yue, E. Smirni, and D. Nikolopoulos. Power-aware Resource Allocation via Online Simulation with Multiple-queue Backfilling. In *The 7th International Workshop on Performability Modeling of Computer and Communication Systems (PMCCS-7)*, Torino, Italy, September 2005. (Extended abstract).

- B. Lawson and E. Smirni. Power-aware Resource Allocation in High-end Systems via Online Simulation. In *Proc. of the 19th ACM Intl. Conf. on Supercomputing (ICS05)*, pages 229–238, Cambridge, MA, June 2005.

- D. Szajda, W. Owen, B. Lawson, A. Charlesworth, and E. Kenney*. An Alternate Multiplicity-2 Task Assignment Scheme for Distributed Computations. In *Scheduling and Resource Management for Parallel and Distributed Systems (SRMPDS 05)* in conjunction with *The 2005 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA 05)*, pages 59–65, Las Vegas, NV, June 2005.

- B. Lawson and E. Smirni. Self-Adaptive Scheduler Parameterization Via Online Simulation. In *Proc. of the 19th International Parallel and Distributed Processing Symposium (IPDPS 2005)*, Denver, CO, April 2005.

- D. Szajda, B. Lawson, and W. Owen. Hardening Functions for Large-Scale Distributed Computations. In *Proceedings of the 2003 IEEE Symposium on Security and Privacy*, pages 216-224, Berkeley, CA, May 2003.

- B. Lawson, E. Smirni, and D. Puiu. Self-adapting Backfilling Scheduling for Parallel Systems. In *Proc. of the 2002 Intl. Conf. on Parallel Processing (ICPP 2002)*, pages 583-592, Vancouver, B.C., August 2002.

- B. Lawson and E. Smirni. Multiple-queue Backfilling Scheduling with Priorities and Reservations for Parallel Systems. *SIGMETRICS Performance Evaluation Review*, 29(4):40–47, March 2002.

- B. Lawson and E. Smirni. Multiple-queue Backfilling Scheduling with Priorities and Reservations for Parallel Systems. In *8th Annual Workshop on Job Scheduling Strategies for Parallel Processing,* pages 72-83, Edinburgh, Scotland, July 2002.

- B. Lawson and S. Park. Asynchronous Time Evolution in an Artificial Society Model. *Journal of Artificial Societies and Social Simulation*, 3(1), January 2000.

Grants and External Funding

- University of Richmond Summer Research Fellowship, $6000. "Evaluating Pitch Effectiveness in Entrepreneur and Investor Processes using Simulation", June 2017–August 2017.

- University of Richmond PETE Course Development Grant, $2000. "SMART CS: Supplementing the *Science, Math, and Research Training* (SMART) Course with Introductory Computer Science." Awarded April 2016.

- NSF #SMA-1327561, Interdisciplinary Behavioral and Social Science Research, $249,852. "IBSS-Ex: SBP: RUI: An Interdisciplinary Approach for Increasing Female Involvement and Achievement in STEM", Jeni L. Burnette, Crystal L. Hoyt, Barry G. Lawson, Carol Dweck, and Jeremy N. Bailenson, 2013–2015.

- University of Richmond Faculty Research Grant, $5030. "Leadership in Emergent-Behavior Robot Systems". Awarded December 2013.

- University of Richmond Summer Research Fellowship, $6000. "Modeling Antibiotic-Resistant Hospital Infection Dynamics", June 2011–August 2011.

- University of Richmond Summer Research Fellowship, $6000. "An Open-Source General-Purpose Graphical Simulation Language", June 2010–August 2010.

- NSF #0524239, Cyber Trust, Division of Information & Intelligent Systems, $401,193. "CT-ISG/RUI: Ensuring Computation Integrity in Distributed Volunteer Computing Platforms", Douglas C. Szajda, Barry G. Lawson, and W. Jason Owen, September 2005 – August 2008, extension through August 2009.

- University of Richmond Summer Research Fellowship, $5000. "A Configurable Self-adapting Scheduler for Heterogeneous Parallel Systems", June 2003–August 2003.

Selected Presentations

- "Simulation 101 Workshop", with L. Leemis. Pre-conference workshop given at Winter Simulation Conference, each December in 2006 – 2011, 2012 (with L.F. Perrone), 2013 – 2022.

- "Feedback Loop: One Computer Scientist's View of Teaching and Research". Colony Family Professorship Lecture, Bates College, 10 March 2022.

- "Structuring a Simulation Course Around the `simEd` Package for R", with L. Leemis. To *2021 Winter Simulation Conference* (Virtual). 16 December 2021.

- "Animation for Simulation Education in R", with L. Leemis, V. Kudlay*. To *2020 Winter Simulation Conference* (Virtual). 15 December 2020.

- "An R Package for Simulation Education", with L. Leemis. To *2017 Winter Simulation Conference*, Las Vegas, NV. 11 December 2017.

- "An Agent-Based Simulation Model of Sponge:Algae Symbiotic Relationships", with M. Hill. In *2016-17 Colloquium Series*, Dept. of Mathematics and Computer Science, University of Richmond, 27 March 2017.

- "Modeling Biological Systems Using Agent-Based Simulation." In *Faculty and Student Talk (FaST) Series*, Dept. of Mathematics and Computer Science, Denison University, 28 September 2016.

- "Engaging Students in Teaching and Research", with C. Parish. Program for Enhancing Teaching Effectiveness (PETE) luncheon, University of Richmond. 6 April 2016.

- "An Agent-Based Simulation Model Of Sponge:Algae Symbiotic Relationships", with C. Hughes*. To *2015 Winter Simulation Conference*, Huntington Beach, CA. 9 December 2015.

- "Discrete-Event Simulation Using R", with L. Leemis. To *2015 Winter Simulation Conference*, Huntington Beach, CA. 8 December 2015.

- Presentation of *IQS* and *SMART* courses, with A. Hill and W. Case. At NSF-funded "CS+X Workshop", Olin College of Engineering, Needham, MA, 2–3 Oct 2015.
- "Introduction to Monte Carlo and Discrete-Event Simulation", with L. Leemis. INFORMS Continuing Education Course for Analytics Professionals. 28–29 May 2015, Washington, DC.
- "A Hybrid Agent-Based and DE/Probabilistic Model for Simulating Antibiotic Resistance in a Hospital Ward". To *2015 INFORMS Computing Society Conference*, Richmond, VA, 12 January 2015.
- "Introduction to Monte Carlo and Discrete-Event Simulation", with L. Leemis. INFORMS Continuing Education Course for Analytics Professionals. 16–17 Oct 2014, Chicago, IL.
- "Monte Carlo Simulation". To Discrete Structures class (J. Paulen) at Deep Run High School, 29 May 2014.
- "A Hybrid Agent-Based and Differential Equations Model for Simulating Antibiotic Resistance in a Hospital Ward." To *2013 Winter Simulation Conference*, Washington, DC, 9 December 2013.
- "Introducing Computer Science in an Integrated Science Course", with L. Barnett. To *44th ACM SIGCSE Technical Symposium*, Denver, CO, 8 Mar 2013.

Professional Service

- Program Committees:
  - *Winter Simulation Conf.*: Environ. & Sustainability Apps. (2016 –), Agent-Based Simulation (2016)
  - *Workshop on Scheduling & Resource Management for Parallel & Distributed Systems* (2005–10)
- Chair: INFORMS Academic Programs Database Committee (2016–17)
- Steering Group: *Network and Distributed System Security Symposium (NDSS)* (2009–12)
- Publications Chair: *NDSS 2008–10*; *SIMUTools 2010*
- Proceedings Co-editor: 2006 Winter Simulation Conference (WSC)
- Location Chair: Richmond Java Users Group (RJUG) (2012–16)
- Reviewer: *WSC*, *ACM SIGCSE*, *IEEE TPDS*, *JPDC*, *IPDPS*, *NDSS*, *ACM SIGMETRICS PER*
  - *WSC* 2020 Outstanding Reviewer Award
  - *WSC* 2019 Outstanding Reviewer Award
- Member: Assoc. for Computing Machinery (ACM)

Selected Service/Participation (Bates College)

- Chair, Digital & Computational Studies (2021–)
- Chair, DCS Faculty Search (2023–24)
- Member, Mathematics Faculty Search (2022–23, 2023–24)
- Member, Theater & Dance Search (2024)
- Member, Economics Faculty Search (2022–23)
- Member, Environmental Studies Faculty Search (2022–23)
- Developer, Maine DOE MOOSE Platform (2021–22)

Selected Service/Participation (University of Richmond)

- Computer Science Coordinator/Chair (2012–20)
- University Faculty Senate (2017–20)
- IT Governance Steering Committee (2019–20)
- Chair, Computer Science Faculty Searches (2019–20, 2015–16, 2014–15)
- *URISE* Summer Bridge Program (2017–20)
- *Inclusive Pedagogy Cohort* (2018–19)
- Diversity Advocate, Computer Science Faculty Search (2017–18)
- Richmond Science Scholars Selection Committee (2006–16)
- Richmond Scholars Steering Committee (2012–15)
- Goldwater Scholarship Selection Committee (2010–20)

- *Critical Diversity* Faculty Learning Community (2015–16, 2016–17)
- *Inclusive Pedagogy in STEM* Faculty Learning Community (2016–17)
- *Terms of Racial Justice* (ToRJ) Working Group (2015–16)
- Students of Color STEM Recruitment Working Group (2012–13)
- Vice President for Enrollment Management Search Committee (2014–15)
- *Roadmap to Success* Pre-Orientation Short Course & Advising (2008–15)
- *Roadmap*/LLC/*SSIR* Evaluation Committee (2014–15)
- Ad Hoc Curriculum Task Force, General Education Subcommittee (2009–10)
- Faculty Sponsor, UR ACM Student Chapter (2009–16)
- Faculty Coach, UR ACM Programming Contest Teams (2009–16)
- Faculty Sponsor, Grace Hopper Celebration of Women in Computing (2011, 2012)