

James Rasmussen Wilcox

Curriculum Vitae

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EDUCATION

Ph.D.	Computer Science & Engineering	University of Washington	Aug. 2021
M.S.	Computer Science & Engineering	University of Washington	Dec. 2015
B.A.	Computer Science and Mathematics	Williams College	June 2013

PRIMARY EMPLOYMENT

Paul G. Allen School of Computer Science & Engineering, University of Washington.

- Assistant Teaching Professor. September 2022–present
- Full-time Temporary Lecturer. September 2021–August 2022
- Part-time Temporary Lecturer. March 2020–June 2021

TEACHING INTERESTS

I teach programming, languages, and systems, and theory courses across all levels and backgrounds, and to undergraduate CS majors and non-majors and to graduate students.

CLASSES TAUGHT AT UW

CSE 123	Introduction to Programming III (CS2)	24wi , 24au , 25au
CSE 311	Foundations of Computing I	22au , 23sp , 24sp
CSE 331	Software Design and Implementation	21au , 22au , 24sp , 25wi , 26wi , 26sp
CSE 341	Programming Languages	17wi , 20au , 21au , 22sp , 23au
CSE 344	Introduction to Data Management	25wi
CSE 374	Intermediate Programming Concepts and Tools	21wi
CSE 451	Operating Systems	25sp
CSE 452	Distributed Systems	22wi , 23wi , 23au , 26sp
CSE 490P	Adv. Prog. Lang. and Verification	20sp
CSE 493X	Web Browser Engineering	22sp , 23sp
CSEP 505	Graduate Programming Languages	21sp , 23wi , 25sp
CSEP 552	Graduate Distributed Systems	24wi

CURRICULUM DEVELOPMENT HIGHLIGHTS

CSE 311: Foundations of Computing I.

- Help develop and maintain Cozy and Grin, along with Kevin Zatloukal and Robbie Weber. These are web-based pedagogical tools used in CSE 311 to help students with logic/proofs and state machines.

CSE 331: Software Design and Implementation.

- Worked on continuing course curriculum development with Kevin Zatloukal and Matt Wang (2022–present), focused on a smoother on-ramp from the introductory sequence into programming-in-the-large.
- Ongoing iteration including app-based programming integrated into mid-quarter homework assignments.

CSE 341: Programming Languages.

- Contributed new homework and slides to pool of curriculum materials shared by all course instructors.
- Ported the course from SML to OCaml and from Ruby to object-oriented Racket.

CSE 344: Introduction to Data Management.

- Ported course infrastructure off Microsoft Azure to a locally-hosted Postgres instance after Microsoft cancelled their educational grant program. Collaborated with CSE support to set up local cycles for the autograder; ported assignments and the autograder to Postgres.
- Refreshed homeworks with a mixture of query writing, Java coding, and theoretical questions in the early assignments. Pulled new airline data from the federal government.

CSE 374: Intermediate Programming Concepts and Tools.

- Piloted contract-based assignments and grading for this introductory systems programming class *for non-majors*.

CSE 452: Distributed Systems.

- Introduced opt-in W (Writing) credit based on design documents, satisfying university-level general education requirements.
- Helping to maintain dslabs, the programming projects for this course.
- Coauthoring a textbook on distributed systems with Ellis Michael and Tom Anderson.

CSE 490P: Advanced Programming Languages and Verification.

- Pitched and designed this new advanced undergraduate seminar on the theory and practice of programming languages and verification. Students learned to do metatheory and implement type checkers and interpreters.
- Developed new course materials including ~25 lectures and 12 homeworks (6 written and 6 programming).

CSE/CSEP 505: Graduate Programming Languages.

- Piloted additive and transparent grading system.
- Developed new [web IDE](#) system for programming in System F.

COTEACHING

- CSE 123 Introduction to Programming III: with Brett Wortzman (24wi).
- CSE 311 Foundations of Computing I: with Kevin Zatloukal (22au, 24sp); with Paul Beame (23sp).
- CSE 331 Software Design and Implementation: with Kevin Zatloukal (22au, 24sp).
- CSE 505 Graduate Programming Languages: with Zachary Tatlock (23wi, 25sp).

ADDITIONAL TEACHING EXPERIENCE

- Teaching Assistant, CSEP 505, Spring 2019. Instructor: Prof. Zachary Tatlock.
- Teaching Assistant, CSE 505, Autumn 2013. Instructor: Prof. Zachary Tatlock.

OTHER EMPLOYMENT

- Advisor (part-time), Certora, January 2021–December 2021

- CTO, Certora, June 2019–December 2020
- Research Assistant, Prof. Zachary Tatlock, University of Washington, Seattle, WA, 2013–2019
- Research Intern, Dr. Jay Lorch, Microsoft Research, Redmond, WA, Summer 2017
- Research Assistant, Prof. Stephen Freund, Williams College, Williamstown, MA, 2012–2013
- Research Intern, Prof. Scott Shenker, ICSI, Berkeley, CA, Summer 2011
- Systems Administrator, Mary Bailey, Williams College, Williamstown, MA, Summer 2010

AWARDS AND FELLOWSHIPS

- Distinguished paper award, PLDI 2020
- Distinguished paper award, PLDI 2015
- National Science Foundation Graduate Research Fellowship, 2013–2018

ADVISING AND MENTORING

Undergraduate Research and Teaching Supervised

- Jaela Field. Mentored CSE 331 TA in 2024–2025; instructor of record for CSE 331 in Summer 2025.
- Amal Jacob. BS/MS independent study on database pedagogy. Winter 2025.
- Mehki Polo. UW ad-hoc honors project on distributed query execution. Winter 2025.
- Theo Gregersen. Trained as new infrastructure TA in CSE 452, Winter 2023.
- Alex Fischman. Verification of distributed systems (in collaboration with VMware Research). 2023.
- David Thien. Compiler testing. 2018.
- Ethan Shea. Automated verification of distributed systems. 2018.
- Justin Adsuara. Verified serialization. 2017–2018.
- Taylor Blau. PL techniques for 3D printing and compositional verification of distributed systems. 2017–2018.
- Miranda Edwards. Compositional verification of distributed systems. 2016–2017.
- Ryan Doenges. Verifying distributed systems with dynamic participants. 2015–2017. Now a Ph.D. student at Cornell.
- Steve Anton. Formal verification of the Raft consensus protocol. 2015–2016.

SIGPLAN Mentoring Program

- Karuna Grewal. 2020–2022. I helped mentor Karuna through the Ph.D. application process. She is now a Ph.D. student at Cornell.
- Dani Wang. 2020–2022. I helped mentor Dani through the Ph.D. application process. They are now a Ph.D. student at UT Austin.
- George Pîrlea. 2020–2022. George is a second-year Ph.D. at NUS.
- Aaron Weiss. 2021–2022. Aaron is a fifth-year Ph.D. student at Northeastern.
- Siddharth Bhat. 2021–2022. Siddharth is a first-year Ph.D. student at the University of Edinburgh.

TEACHING MATERIALS

Teaching Principles, living document, April 2022–present

- A collection of my teaching principles, updated over time as my thinking evolves.
- Available at jamesrwilcox.com/teaching-principles.html.

Coteaching Documentation, 2022

- Developed internal Allen School documentation on coteaching models and their effectiveness, drawing on my coteaching experience with Kevin Zatloukal, Zach Tatlock, Paul Beame, and Brett Wortzman.

SOFTWARE MAINTAINED

mypyvy, Primary Developer and Maintainer, 2018–present

- An intermediate language and toolkit for manipulating symbolic transition systems.
- Transition systems are written in a decidable fragment of first-order logic.
- Supports verifying and synthesizing inductive invariants and several forms of bounded model checking.
- Has provided the basis for implementing tools described by several of my recent papers (CAV19, POPL22, CAV24), as well as several papers by other researchers of which I am not an author.
- mypyvy itself is implemented in statically typed (!) Python and uses Z3 and CVC5 as underlying solvers.
- Available on GitHub: <https://github.com/wilcoxjay/mypyvy>

dslabs, Contributor, 2022–present

- Set of programming projects used in CSE 452 Distributed Systems.
- Contributions include bug fixes to the visual debugger, improvements to running-time computation in the test framework, student-facing test documentation, and a more flexible student-facing testing script.
- Available on GitHub: <https://github.com/emichael/dslabs>

Cozy and Grin, Codeveloper and Maintainer with Kevin Zatloukal, 2022–present

- Web-based pedagogical tools used in CSE 311 Foundations of Computing I to help students with logic and state machines.

SERVICE

Allen School Service

- Unofficial teaching mentor, Taylor Kessler Faulkner, Sept 2024–June 2025
- Undergraduate Admissions Committee, Sept 2023–June 2025
- Undergraduate Curriculum Committee, Sept 2024–present
- Teaching Faculty Recruiting Committee, Sept 2023–June 2024
- Hosted teaching-track faculty candidates, Winter 2024 and Winter 2025
- Participated in teaching-track candidate demos with feedback, Winter 2023 and Winter 2025 and Winter 2026
- Hosted visiting researchers: Daniel Seita (Nov. 2022), Loris D’Antoni (Jul. 2023), Matthew Flatt (Sept. 2023)
- Letters of recommendation: 12 external for master’s/Ph.D. programs (Autumn 2023), 16 BS/MS (June 2023), 14 BS/MS (Summer 2024), 7 external (Autumn 2024)

- Presenter, Allen School Rising into the 300s program, September 2022
- Outreach: Hosted Robinson Center middle school class on theory of computation, July 2023

University of Washington Service

- University Committee on General Education, Writing and Composition Board, Sept 2024–present

External Service

- Computing Connections Fellowship (CCF) Selection Committee member, 2022–present
- PLDI 2023 PC member
- PLDI 2023 Student Research Competition judge
- POPL 2022 PC member
- OSDI 2021 ERC member
- ASPLOS 2021 ERC member
- VMCAI 2021 PC member
- OOPSLA 2020 external reviewer
- PLDI 2019 external reviewer
- POPL 2019 external reviewer
- OOPSLA 2018 external reviewer
- POPL 2017 external reviewer

PUBLICATIONS

Also available on [DBLP](#) and [Google Scholar](#).

Invited Articles

- Highlights in Systems Verification. **James R. Wilcox**. Communications of the ACM (**CACM**), February 2018.

Conference Publications

- mypyvy: A Research Platform for Verification of Transition Systems in First-Order Logic. **James R. Wilcox**, Yotam M. Y. Feldman, Oded Padon, and Sharon Shoham. International Conference on Computer-Aided Verification (**CAV**) 2024.
- Property-Directed Reachability as Abstract Interpretation in the Monotone Theory. Yotam M. Y. Feldman, Sharon Shoham, Mooly Sagiv, and **James R. Wilcox**. Principles of Programming Languages (**POPL**) 2022.
- Induction Duality: Primal-Dual Search for Invariants. Oded Padon, **James R. Wilcox**, Jason R. Koenig, Kenneth L. McMillan, and Alex Aiken. Principles of Programming Languages (**POPL**) 2022.
- Learning the Boundary of Inductive Invariants. Yotam M. Y. Feldman, Sharon Shoham, Mooly Sagiv, and **James R. Wilcox**. Principles of Programming Languages (**POPL**) 2021.
- Armada: Low-Effort Verification of High-Performance Concurrent Programs. Jacob R. Lorch, Yixuan Chen, Manos Kapritsos, Bryan Parno, Shaz Qadeer, Upamanyu Sharma, **James R. Wilcox**, and Xueyuan Zhao. Programming Languages Design and Implementation (**PLDI**) 2020. **Distinguished Paper**.
- Synthesizing Structured CAD Models with Equality Saturation and Inverse Transformations. Chandrakana Nandi, Max Willsey, Adam Anderson, **James R. Wilcox**, Eva Darulova, Dan Grossman, and Zachary Tatlock. Programming Languages Design and Implementation (**PLDI**) 2020.

- Inferring Inductive Invariants from Phase Structures. Yotam M. Y. Feldman, **James R. Wilcox**, Sharon Shoham, Mooly Sagiv. International Conference on Computer-Aided Verification (**CAV**) 2019.
- Functional Programming for Compiling and Decompiling Computer-Aided Design. Chandrakana Nandi, **James R. Wilcox**, Pavel Panchekha, Taylor Blau, Dan Grossman, and Zachary Tatlock. International Conference on Functional Programming (**ICFP**) 2018.
- Modularity for Decidability of Deductive Verification with Applications to Distributed Systems. Marcelo Taube, Giuliano Losa, Kenneth McMillan, Oded Padon, Mooly Sagiv, Sharon Shoham, **James R. Wilcox**, and Doug Woos. Programming Languages Design and Implementation (**PLDI**) 2018.
- VerifiedFT: A Verified, High-Performance Dynamic Race Detector. **James R. Wilcox**, Cormac Flanagan, and Stephen N. Freund. Principles and Practice of Parallel Programming (**PPoPP**) 2018.
- Programming and Proving with Distributed Protocols. Ilya Sergey, **James R. Wilcox**, and Zachary Tatlock. Principles of Programming Languages (**POPL**) 2018.
- Ceuf: Minimizing the Coq Extraction TCB. Eric Mullen, Stuart Pernsteiner, **James R. Wilcox**, Zachary Tatlock, and Dan Grossman. Certified Programs and Proofs (**CPP**) 2018.
- Programming Language Abstractions for Modularly Verified Distributed Systems. **James R. Wilcox**, Ilya Sergey, and Zachary Tatlock. Summit on Advances in Programming Languages (**SNAPL**) 2017.
- Planning for Change in a Formal Verification of the Raft Consensus Protocol. Doug Woos, **James R. Wilcox**, Steve Anton, Zachary Tatlock, Michael D. Ernst, and Thomas Anderson. Certified Programs and Proofs (**CPP**) 2016.
- Array Shadow State Compression for Precise Dynamic Race Detection. **James R. Wilcox**, Parker Finch, Cormac Flanagan, and Stephen N. Freund. Automated Software Engineering (**ASE**) 2015.
- Verdi: A Framework for Formally Verifying Distributed System Implementations. **James R. Wilcox**, Doug Woos, Pavel Panchekha, Zachary Tatlock, Xi Wang, Michael D. Ernst, and Thomas Anderson. Programming Languages Design and Implementation (**PLDI**) 2015.
- Automatically Improving Accuracy for Floating Point Expressions. Pavel Panchekha, Alex Sanchez-Stern, **James R. Wilcox**, and Zachary Tatlock. Programming Languages Design and Implementation (**PLDI**) 2015. **Distinguished Paper**.

Workshop Publications

- Verification of Implementations of Distributed Systems Under Churn. Ryan Doenges, **James R. Wilcox**, Doug Woos, Zachary Tatlock, and Karl Palmkog. Workshop on Coq for Programming Languages (**CoqPL**) 2017.
- Information-centric networking: Seeing the forest for the trees. Ali Ghodsi, Scott Shenker, Teemu Koponen, Ankit Singla, Barath Raghavan, and **James Wilcox**. Workshop on Hot Topics in Networks (**HotNets**) 2011.
- Intelligent design enables architectural evolution. Ali Ghodsi, Scott Shenker, Teemu Koponen, Ankit Singla, Barath Raghavan, and **James Wilcox**. Workshop on Hot Topics in Networks (**HotNets**) 2011.

Journal Publications and Theses

- Armada: Automated Verification of Concurrent Code with Sound Semantic Extensibility. Jacob R. Lorch, Yixuan Chen, Manos Kaprutos, Haojun Ma, Bryan Parno, Shaz Qadeer, Upamanyu Sharma, **James R. Wilcox**, and Xueyuan Zhao. ACM Transactions on Programming Languages and Systems (**TOPLAS**), Volume 44, Issue 2, May 2022.
- Compositional and Automated Verification of Distributed Systems. **James R. Wilcox**. Ph.D. Thesis, 2021.
- Sets Characterized by Missing Sums and Differences in Dilating Polytopes. Thao Do, Archit Kulkarni, Steven J. Miller, David Moon, Jake Wellens, and **James Wilcox**. Journal of Number Theory, 2015.
- ShrinkWrap: Efficient Dynamic Race Detection for Array-Intensive Programs. **James Wilcox**. Stephen N. Freund, Advisor. Williams College Undergraduate Honors Thesis, 2013.

TALKS

- `mypyvy`: A Research Platform for Verification of Transition Systems in First-Order Logic. Conference talk at CAV. Montreal, Canada. July 2024.
- Intro to Dafny. Guest Lecture. University of Utah. Salt Lake City, Utah. September 2021.
- Transition Systems, Verification, and Dafny. Guest Lecture. University of Utah. Salt Lake City, Utah. March 2020.
- Verifying Distributed Systems with `mypyvy`. Seminar Talk. University of Utah. Salt Lake City, Utah. March 2020.
- Compositional Verification of Distributed Systems. Thesis Defense. University of Washington, Seattle, WA. May 2019.
- Goldilocks the Verification Engineer. Galois. Portland, OR. March 2019.
- Verifying Distributed Systems. New England Systems Verification Day. Cambridge, MA. October 2018.
- Compositional Verification of Distributed Systems.
 - Invited talk. Tel Aviv University, Israel. March 2018.
 - PLSE retreat. Leavenworth, WA. September 2016.
- VerifiedFT: A Verified, High-Performance Dynamic Race Detector. Conference talk at PPOPP. Vienna, Austria. March 2018.
- Programming and Proving with Distributed Protocols. Conference talk at POPL. Los Angeles, CA. January 2018.
- Programming Language Abstractions for Modularly Verified Distributed Systems. Conference talk at SNAPL. Monterey, CA. May 2017.
- Verdi: A Framework for Formally Verifying Distributed System Implementations.
 - Invited talk. University College London. United Kingdom. June 2016.
 - Invited talk. Google. Seattle, WA. June 2016.
- Planning for Change in a Formal Verification of the Raft Consensus Protocol. Conference talk at CPP 2016. St. Petersburg, FL. January 2016.
- Array Shadow State Compression for Precise Dynamic Race Detection. Conference talk at ASE. Lincoln, NE. November 2015.