Sarah Smith Heckman

Teaching Professor
Director of Undergraduate Programs
Alumni Distinguished Undergraduate Professor

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Summary

I am an Alumni Distinguished Undergraduate Professor and Director of Undergraduate Programs for the Department of Computer Science at NC State University. My areas of expertise are software engineering and computer science education. I have taught over 16,000 credit hours in core software engineering and programming languages courses to over 5,000 students between Fall 2009 and Spring 2022. I am supported by over $5M in sponsored grants and awards as a PI or co-PI and I have published 20+ peer reviewed journal and conference papers. I am a member of the Academy of Outstanding Teachers at NC State and a Senior Member of ACM and IEEE. In 2017, I was one of the inaugural NC State CSC Outstanding Young Alumni awardees. I was the co-Program Chair of the 2019 and 2020 SIGCSE Technical Symposiums.

Professional Career

July 2020 – present	Teaching Professor Director of Undergraduate Programs (2018-present) Department of Computer Science, North Carolina State University, Raleigh NC • Load of four (4) courses per academic year • Research in computer science and software engineering education • Honors Program Coordinator • Course coordinator for CSC216 • Service to the department, college, and community
July 2015 – June 2020	Associate Teaching Professor Assistant Director of Undergraduate Programs (2016-2018) Department of Computer Science, North Carolina State University, Raleigh NC • Co-coordinator of CSC Accreditation (2016-2018)
Aug. 2009 – June 2015	Assistant Teaching Professor, Department of Computer Science, North Carolina State University, Raleigh, NC
June 2009	R&D Engineer Intern, US Corporate Research, ABB, Inc., Raleigh, NC
May 2006 – May 2009	Software Engineer Intern, Tivoli, Software Group, IBM, Research Triangle Park, NC

Education

2005-2009	Doctorate of Philosophy, Computer Science, North Carolina State University, Raleigh, NC Title: *A Systematic Model Building Process for Predicting Actionable Static Analysis Alerts* Advisor: Dr. Laurie Williams

2004-2005	Masters of Computer Science, North Carolina State University, Raleigh, NC
2000-2004	Bachelor of Science, Computer Science, North Carolina State University, Raleigh, NC

Awards & Honors

2021	Senior Member – ACM & IEEE
2019	Computer Science Person of Exceptional Performance (PEP) Award
2019, 2008	ACM/AITP "Joyce Hatch Service" Award [student vote]
2018	Alumni Distinguished Undergraduate Professor Award
2018, 2014	ACM/AITP "Carol Miller Outstanding Lecturer" Award [student vote]
2017	Inaugural NC State CSC Outstanding Young Alumni Award
2017, 2013, 2011	Recognized by the "Thank a Teacher" Program at NC State University
2017, 2013, 2011	ACM/AITP "Most Receptive Professor Outside the Classroom" Award [student vote]
2015	NC State Outstanding Teacher Award and membership to the Academy of Outstanding Teachers
2015	NC State Alumni Association Outstanding Teacher Award
2012	Pride of the Wolfpack Award
2006-2009	IBM PhD Fellowship - $17,500 9-month stipend + tuition and fees per year

Teaching

Instructional Development

- CSC116: Introduction to Programming - Java
  - *Textbook:* Worked with colleagues to adopt a new textbook, *Building Java Programs* by Reges and Stepp, following an objects-late paradigm.
  - *Testing in CSC116*: Authored an introductory testing document that introduces students to white-box and black-box testing:
- CSC216: Programming Concepts – Java
  - *CSC216 Course Redesign:* Oversaw increase from 3 to 4 credit hours through adding an open lab to the course in Fall 2016. Created connected guided projects and lab activities to support major learning outcomes and refactored lectures to support lab activities. The changes were supported by a DELTA Course Redesign Grant. Average DFW rates decreased by 12% due to the redesign.
  - *Peer Teaching Fellows Program:* Oversee hiring and training of Peer Teaching Fellows (PTFs) for CSC216, which are TA positions, some of which are supported by a Google CS Capacity Award.
  - *Software Engineering in CSC216*: Added static analysis and code coverage to programming assessment.
- CSC326: Software Engineering
  - *CSC326 Course Redesign*: Oversaw increase from 3 to 4 credit hours. Restructured course projects and integrated team training. Supervised two students in creating a new base project for the class. Collaborated with Software Engineering faculty to modernize the course. The changes are supported by a DELTA Course Redesign Grant.
- Cross-Course Instructional Development
  - *Software Engineering Tools to Support Automated Course Grading*: Incorporation of a continuous integration tool, Jenkins, and version control, GitHub, for evaluation of student work while reinforcing good software engineering practices in CSC116, CSC216, CSC230, CSC316, and CSC326. A paper about the project was accepted to SIGCSE 2018.

- *Google Forms as a Classroom Response System*: students submit in-class exercises through Google Forms, which allows for more complex responses and quick identification of students mis-understandings (with Dr. Ed Gehringer) in CSC216, CSC230, and CSC326.
- *CPATH II*: I have worked with a team of educators at NC State, University of Miami – Ohio, and other universities on the CPATH II grant for incorporating communication learning outcomes and assignments into the CS undergraduate curriculum in CSC116, CSC216, and CSC326. A paper about the project was accepted to the SEET track of ICSE 2015.

- TA Training
  - *University TA Training*: Worked with the Graduate School to coordinate a university-wide day-long TA training program in 2017. All COE TAs are now expected to attend the University TA Training program.
  - *COE TA Training:* Coordinated TA Training for new College of Engineering PhD students from 2015-2016. The training consisted of a three-hour Saturday seminar and managing three elective seminars taught by other COE faculty.
  - *TA Training*: An undergraduate special topics course taught in Fall 2016 for TAs in low-level undergraduate courses. Developed with support of Google CS Capacity RTPTF Award.
  - *Workshop – TA'ing Courses with Computer-Intensive Assignments*: Workshop for graduate student teaching assistants introducing them to techniques for evaluating and helping students in courses with computer-intensive assignments. Fall 2012, Fall 2013, Fall 2014.

Courses Taught

- **CSC116**: Introduction to Computing – Java (Fall 2009 [2 sections], Spring 2010 [2 sections], Spring 2011, Fall 2011, Spring 2012, Spring 2013, Spring 2015)
- **CSC216**: Software Development Fundamentals (Spring 2010, Summer 2010, Spring 2011, Fall 2011, Spring 2012, Fall 2012 [2 sections], Spring 2013, Fall 2013, Fall 2014 [2 sections], Fall 2015, Spring 2016, Fall 2016 [2 sections], Spring 2017, Fall 2017, Spring 2018 [2 sections], Fall 2018, Spring 2019, Fall 2019, Spring 2020 [2 sections], Fall 2020, Spring 2021 [2 sections], Fall 2021 [2 sections], Spring 2022 [2 sections])
- **CSC230**: C and Software Tools (Fall 2011, Spring 2012, Summer 2012, Fall 2012, Spring 2013, Fall 2013, Spring 2014, Spring 2015)
  - Distance Education offering of CSC230 (Summer 2012, Fall 2012, Spring 2013, Fall 2013, Spring 2014, Summer 2014, Fall 2014, Spring 2015, Fall 2015, Spring 2016)
- **CSC295**: TA Training (Fall 2016)
- **CSC326**: Software Engineering (Spring 2011, Fall 2013, Fall 2014, Fall 2015, Fall 2017, Spring 2019, Fall 2019, Fall 2020, Spring 2022)
- **CSC492**: Senior Design (Spring 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018)
- **CSC801**: Seminar Course (Spring 2012, Fall 2014)

Professional Development

Fall 2016	CRA-W Career Mentoring Workshop (Mid-career)
Spring 2014	Office of Faculty Development's Summer Institute on the Scholarship of Teaching and Learning
Spring 2014	Completed Certificate of Reflective Teaching through the Office of Faculty Development
2011-2012	Mentee in Peer Scholar Program through the Office of Faculty Development
Spring 2011	Workshop on Managing the Academic Career for Women Faculty in Undergraduate Computing Programs (co-located with SIGCSE 2011)

Student Supervision & Mentoring

Ph.D. Student

2012-2017	Brittany Johnson, PhD, "Augmenting Program Analysis Tool Intelligence" (Defended May 2017)
2019-	Gabriel Silva de Oliveria
2019-2022	Kai Presler-Marshall

Research

My overall goal is to scaffold software engineering skills throughout the core courses in the software engineering and programming languages area to support the software engineering lifecycle and debugging skills. Following the theory of *situated learning*, students are considered novice software engineers and work with tools and practices that professionals use. Additionally, as class size grows, I seek to provide tooling and automation to help students develop help-seeking and debugging skills.

CS1.5 Laboratories

Students have reported in class evaluations that they would like to engage more deeply with recently learned concepts and software engineering practices through larger programming exercises completed during class time. I introduced in-class laboratories into CSC216 in AY2015-2016 and we moved to open lab sections lead by Peer Teaching Fellows in AY2016-2017. Automation and data mining support interventions in help-seeking and scaffolding to support student learning and debugging skills. Adding a separate lab section lead to an average 12% decrease in DFW rates. This work has been supported by a DELTA Critical Path Course Redesign Grant, a Google CS Capacity Award, and NSF grants.

Software Engineering Technologies and Teaming

The CSC326 – Software Engineering course was redesigned to better support students when learning new technologies on teams. The updated course emphasizes training in new technologies and working effectively on teams. We found that students with higher self-efficacy in the project technologies had a higher collaboration self-efficacy and peer-rated collaboration performance. Further, groups' collaboration behavior predicted their perceptions of collaboration and product quality during each project.

Peer Teaching Fellows

To address the need for additional student support with growing enrollments in CSC216 and other second semester programming courses, the Research Triangle Peer Teaching Fellows (RTPTF) program was created between Duke University, NC State University, University of North Carolina – Chapel Hill, and the University of Florida to identify evidence-based practices for teaching assistants in CS courses. In the next phase of the project, we are focusing on training Peer Teaching Fellows in helping students with debugging skills.

Training Educators in Computing Education Research

I am working in collaboration with Dr. Jeff Carver (University of Alabama) and Dr. Mark Sherriff (University of Virginia) on a project to increase empiricism in CER by training educators in conducting well designed classroom studies. We run a 2.5 day workshop each summer to mentor a cohort of 10-12 educators in creating a research study for their classroom. We regularly meet with participants and have a group follow up at the SIGCSE Technical Symposium. We have mentored six cohorts for a total of 44 participants. Participation in the workshop has led to several publications by participants including 1 FIE work-in-progress paper, 1 FIE paper, 1 ICER paper, 3 SIGCSE Technical Symposium paper, 1 CSCC paper, 1 NSF submission, and 2 planned NSF grants.

Publications

Computer Science is a conference discipline; most scholarly work is published in peer-reviewed conference proceedings. Authorship conventions order authors by contribution. For student authored papers, faculty mentor(s) appear towards the end of the list.

Journal Guest Editor

[1] M. Sherriff and **S. Heckman**, "Capstones and Large Projects in Computing Education," ACM Transactions on Computing Education (TOCE), vol. 18, no. 2, 2018. Impact Factor: 1.821

Journal Papers

[2] **S. Heckman**, J. Carver, M. Sherriff, "A Systematic Literature Review of Empiricism and Norms of Reporting in Computing Education Research Literature," ACM Transactions on Computing Education (TOCE), 22(1), pp. 1-46. Impact Factor: 1.721

[3] N. Gitinabard, Y. Xu, **S. Heckman**, T. Barnes, C. F. Lynch, "How Widely Can Prediction Models Be Generalized? Performance Prediction in Blended Courses," IEEE Transactions on Learning Technologies, pp. 184-197. Impact Factor: 1.869

[4] **S. Heckman** and L. Williams, "A Systematic Literature Review of Actionable Alert Identification Techniques for Automated Static Code Analysis," Information and Software Technology, vol. 53, no. 4, April 2011, pp. 363-387. Impact Factor: 1.821

Conference Proceedings

[5] J. Zhang, M. Sherriff, **S. Heckman**, A. Monge, P. Cutter, "SIGCSE '20: Proceedings of the 51st ACM Technical Symposium on Computer Science Education," ACM, Portland, OR, USA, 2020.

[6] E. K. Hawthorne, M. A. Pérez-Quiñones, **S. Heckman**, J. Zhang, "SIGCSE '19: Proceedings of the 50th ACM Technical Symposium on Computer Science Education," ACM, Minneapolis, MN, USA, 2019.

Refereed Full Conference Papers

[7] J. Carver, S. Heckman, M. Sherriff, "Training Computing Educators to Become Computing Education Researchers," accepted to the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE 2022), pp. 724-730.

[8] Z. Gao, S. Heckman, C. Lynch, "Who Uses Office Hours? A Comparison of In-Person and Virtual Office Hours Utilization," accepted to the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE 2022), pp. 300-306.

[9] K. Presler-Marshall, S. Heckman, K. Stolee, "Identifying Struggling Teams in Software Engineering Courses Through Weekly Surveys," accepted to the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE 2022), pp. 126-132.

[10] B. Erickson, S. Heckman, C. Lynch, "Characterizing Student Development Progress: Validating Student Adherence to Project Milestones," accepted to the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE 2022), pp. 15-21.

[11] N. Gitinabard, S. Heckman, T. Barnes, C. Lynch, "Designing a Dashboard for Student Teamwork Analysis," accepted to the 53rd ACM Technical Symposium on Computer Science Education (SIGCSE 2022), pp. 446-452.

[12] K. Presler-Marshall, S. Heckman, K. Stolee, "SQLRepair: Identifying and Repairing Mistakes in Student-Authored SQL Queries," Joint Software Engineering Education and Training (JSEET) track of the International Conference on Software Engineering (ICSE), 2021, pp. 199-210.

[13] D. Basu, **S. Heckman,** M. L. Maher, "Online Vs Face-to-face Web-development Course: Course Strategies, Learning, and Engagement," SIGCSE 2021, pp. 1191-1197. (Acceptance Rate: 31%)

[14] N. Gitinabard, T. Barnes, **S. Heckman**, C. F. Lynch, "What will you do next? A sequence analysis on the student transitions between online platforms in blended courses," Educational Data Mining 2019, pp. 59-68.

[15] **S. Heckman** and J. King, "Developing Software Engineering Skills using Real Tools for Automated Grading," SIGCSE 2018, pp. 794-799. (Acceptance Rate: 35%)

[16] M. Vellukunnel, P. Buffum, K. E. Boyer, J. Forbes, **S. Heckman**, K. Mayer-Patel, "Deconstructing the Discussion Forum: Student Questions and Computer Science Learning," SIGCSE 2017, pp. 603-608. (Acceptance Rate: 30%) *Exemplary CS Education Research Paper*

[17] A. Smith, K. E. Boyer, J. Forbes, **S. Heckman**, K. Mayer-Patel, "My Digital Hand: A Tool for Scaling Up One-to-One Peer Teaching in Support of Computer Science Learning," SIGCSE 2017, pp. 549-554. (Acceptance Rate: 30%)

[18] B. Johnson, R. Pandita, J. Smith, D. Ford, S. Elder, E. Murphy-Hill, **S. Heckman**, C. Sadowski, "A Cross-Tool Communication Study on Program Analysis Tool Notifications," ACM SIGSOFT International Symposium on the Foundations of Software Engineering, Seattle, WA, USA, November 13-19, 2016, p. 73-84. (Acceptance Rate: 27%)

[19] A. Al-Zubidy, J. Carver, **S. Heckman**, M. Sherriff, "A (Updated) Review of Empiricism at the SIGCSE Technical Symposium," 2016 SIGCSE Technical Symposium, Memphis, TN, March 2-5, 2016, pp. 120-125. (Acceptance Rate: 35.4%)

[20] **S. Heckman**, "An Empirical Study of In-Class Laboratories on Student Learning of Linear Data Structures," International Computing Education Research Conference (ICER), Omaha, Nebraska, USA, August 9-13, 2015, pp. 217-225.

[21] P. V. Anderson, **S. Heckman**, M. Vouk, D. Wright, M. Carter, J. E. Burge, G. C. Gannod, "CS/SE Instructors Can Improve Student Writing without Reducing Class Time Devoted to Technical Content: Experimental Results," Joint Software Engineering Education and Training (JSEET) track of the International Conference of Software Engineering, 2015, p. 455-464.

[22] **S. Heckman** and L. Williams, "A Comparative Evaluation of Static Analysis Actionable Alert Identification Techniques," 9th International Conference on Predictive Models in Software Engineering (PROMISE), Baltimore, Maryland, USA, October 9, 2013, pp. 4:1-4:10. Acceptance Rate: 55%

[23] M. Carter, R. Fornaro, **S. Heckman**, and M. Heil, "Creating a Progression of Writing, Speaking, & Teaming Learning Outcomes in Undergraduate Computer Science/Software Engineering Curricula," World Engineering Education Forum (WEEF), Buenos Aires, Argentina, October 15-18, 2012.

[24] **S. Heckman** and L. Williams, "A Model Building Process for Identifying Actionable Static Analysis Alerts," 2nd IEEE International Conference on Software Testing, Verification, and Validation (ICST), Denver, CO, USA, 2009, pp. 161-170. Acceptance Rate: 33%

[25] **S. Heckman** and L. Williams, "On Establishing a Benchmark for Evaluating Static Analysis Alert Prioritization and Classification Techniques," Proceedings of the 2nd International Symposium on Empirical Software Engineering and Measurement (ESEM) 2008, Kaiserslautern, Germany, October 9-10, 2008, pp. 41-50. Acceptance Rate: 28%

[26] M. Rappa, **S. E. Smith**, A. Yacoub, and L. Williams, "OpenSeminar: A Web-Based Collaboration Tool for Open Educational Resources," Proceedings of the 1st International Conference on Collaborative Computing: Networking, Applications, and Worksharing (CollaborateCon 2005), San Jose, CA, December 19-21, 2005.

Other Refereed Conference & Workshop Papers

[27] N. Gitinabard, R. Okoilu, Y. Xu, **S. Heckman**, T. Barnes, C. Lynch, "Student Teamwork on Programming Projects. What can GitHub logs show us?," Educational Data Mining, July 10-13, 2020, virtual, pp. 409-416.

[28] **S. Heckman**, J. Y. Schmidt, J. King, "Integrating Testing Throughout the CS Curriculum," 1st International Software Testing Education Workshop (TestEd), Online, October 24-28, 2020, pp. 441-444.

[29] K. Presler-Marshall, E. Horton, **S. Heckman**, K. T. Stolee, "Wait Wait. No, Tell Me: Analyzing Selenium Configuration Effects on Test Flakiness," Proceedings of the 14th International Workshop on Automation of Software Test (AST '19), Montreal, Quebec, Canada, May 27, 2019, pp. 7-13.

[30] **S. Heckman**, K. T. Stolee, C. Parnin, "10+ Years of Teaching Software Engineering with iTrust: the Good, the Bad, and the Ugly," ICSE-SEET 2018, pp. 1-4. (Acceptance Rate: 28%)

[31] N. Gitinabard, C. F. Lynch, S. Heckman, T. Barnes, "Identifying Student Communities in Blended Courses," Proceedings of the 10th International Conference on Educational Data Mining, pp. 378-379, 2017.

[32] B. Johnson, R. Pandita, E. Murphy-Hill, S. Heckman, "Bespoke Tools: Adapted to the Concepts Developers Know," 10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering, New Ideas and Emerging Results Track, Bergamo, Italy, August 30-September 4, 2015, pp. 878-881.

[33] M. Sherriff, **S. S. Heckman**, M. Lake, L. Williams, "Identifying Fault-Prone Files Using Static Analysis Alerts Through Singular Value Decomposition," Short Paper, Proceedings of the 2007 Conference of the Center for Advanced Studies on Collaborative Research (CASCON 2007), Richmond Hill, Ontario, Canada, October 22-25, 2007, pp. 276-279.

[34] M. Sherriff, **S. S. Heckman**, M. Lake, L. Williams, "Using Groupings of Static Analysis Alerts to Identify Files Likely to Contain Field Failures," Short Paper, Proceedings of the 6th Joint Meeting of the European Software

Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE 2007), Dubrovnik, Croatia, September 2-7, 2007, pp. 565-568. Acceptance Rate: 25%

[35] **S. S. Heckman**, "Adaptive Probabilistic Model for Ranking Code-Based Static Analysis Alerts," Doctoral Symposium, Companion to the Proceedings of the 29th International Conference on Software Engineering (ICSE 2007), Minneapolis, MN, May 19-27, 2007, pp. 89-90.

[36] **S. S. Heckman** and L. Williams, "Automated Adaptive Ranking and Filtering of Static Analysis Alerts," Fast Abstract, 17th IEEE International Symposium on Software Reliability Engineering (ISSRE 2006), Raleigh, NC, November 7-10, 2006.

[37] M. Rappa, **S. E. Smith**, and A. Yacoub, "Open Course Resources as Part of the OpenSeminar in Software Engineering," Proceedings of the 19th Conference on Software Education and Training (CSEE&T 2006), Turtle Bay, HI, April 19-21, 2006, pp. 187-189.

[38] **S. E. Smith**, L. Williams, and J. Xu, "Expediting Programmer AWAREness of Anomalous Code," Fast Abstract, 16th IEEE International Symposium on Software Reliability Engineering (ISSRE 2005), Chicago, IL, November 8-11, 2005.

[39] L. Williams, **S. E. Smith**, M. Rappa, "Resources for Agile Software Development in the Software Engineering Course," Proceedings of the 18th Conference on Software Engineering Education and Training (CSEE&T 2005), Ottawa, Canada, April 18-20, 2005, pp. 236-238.

Magazine Articles

[40] J. Zhang, M. Sherriff, **S. Heckman**, P. Cutter, A. Monge, "SIGCSE Technical Symposium 2020 Call for Submissions," *ACM SIGCSE Bulletin*, vol. 51, no. 3, August 2019, p. 2-3.

[41] E. K. Hawthorne, M. A. Pérez-Quiñones, **S. Heckman**, J. Zhang, "SIGCSE Technical Symposium 2019 Report" *ACM SIGCSE Bulletin,* vol. 51, no. 2, April 2019, p. 2-4.

[42] **S. Heckman**, J. Zhang, M. A. Pérez-Quiñones, E. K. Hawthorne, "What is a SIGCSE Symposium Paper?," *ACM SIGCSE Bulletin,* vol. 50, no. 3, July 2018, p. 3.

[43] **S. Heckman**, J. Zhang, M. A. Pérez-Quiñones, E. K. Hawthorne, "SIGCSE 2019 Paper Length Change," *ACM SIGCSE Bulletin*, vol. 50, no 2., April 2018, p. 4.

[44] **S. S. Heckman**, "Adaptively Ranking Alerts Generated from Automated Static Analysis," ACM Crossroads, vol. 14, no. 1, Winter 2007, pp. 16-20.

[45] **S. E. Smith** and A. Potoczniak, "Five Points of Connectivity," in EDUCAUSE Review, vol. 40, September/October 2005, pp. 30-40.

Workshops/Panels/Tutorials/Birds of a Feather

[46] **S. Heckman, B. Fain, M.** Pérez-Quiñones, "Building and Expanding a Successful Undergraduate Program," The Journal of Computing Sciences, vol. 18, presented at CCSC-SE, 2019.

[47] **S. Heckman**, J. Carver, M. Sherriff, "Designing Empirical Education Research Studies (DEERS): Creating an Answerable Research Question," SIGCSE 2018 Workshop.

[48] **S. Heckman**, J. Carver, M. Sherriff, "Designing Empirical Education Research Studies (DEERS): Creating an Answerable Research Question," SIGCSE 2017 Workshop.

[49] M. Sherriff and **S. Heckman**, "Empirical Research in CS Education," Birds of a Feather, SIGCSE Technical Symposium, 2015, p. 701.

[50] **S. Heckman**, T. B. Horton, and M. Sherriff, "Teaching Second-Level Java and Software Engineering with Android," 24th IEEE-CS Conference on Software Engineering Education and Training (CSEE&T), Honolulu, Hawaii, May 22-24, 2011, pp. 540-542.

Refereed Abstracts

[51] **S. Heckman** and E. Gehringer "Google Forms as an Enhanced Classroom Response System," Abstract: International Society for the Scholarship of Teaching and Learning (ISSOTL '13).

Technical Reports

[52] **S. Heckman**, A. Al-Zubidy, J. C. Carver, M. Sherriff, "A (Updated) Review of Empiricism at the SIGCSE Technical Symposium," NCSU Technical Report, TR-2015-1, January 5, 2015.

[53] M. Carter, R. Fornaro, **S. Heckman**, and M. Heil, "Developing a Learning Progression that Integrates Communication in an Undergraduate CS/SE Curriculum," NCSU Technical Report, TR-2012-7, May 25, 2012.

[54] **S. Heckman** and L. Williams, "A Systematic Literature Review of Actionable Alert Identification Techniques for Automated Static Code Analysis", NCSU Technical Report, TR-2010-17, July 23, 2010.

[55] **S. Heckman** and L. Williams, "A Measurement Framework of Alert Characteristics for False Positive Mitigation Models," NCSU Technical Report, TR-2008-23, October 28, 2008.

[56] **S. S. Heckman** and L. Williams, "On Establishing a Benchmark for Evaluating Static Analysis Alert Prioritization and Classification Techniques," NCSU Technical Report, TR-2008-11, April 24, 2008.

Research Posters

[57] Y. Shen, D. Spencer, K. Presler-Marshall, **S. Heckman**, C. Parnin, "Promoting Cognitive and Social Awareness during Collaboration Using Group Regulation Guidance: An Exploratory Study," American Educational Research Association 2020 Annual Meeting, under review.

[58] N. Gitinabard, C. Lynch, **S. Heckman**, T. Barnes, "Identifying Student Communities in Blended Courses," 10th International Conference on Educational Data Mining, June 25-28, 2017, Wuhan, Hubei, China.

[59] **S. Heckman**, J. King, "Teaching Software Engineering Skills in CS1.5: Incorporating Real-world Practices and Tools," Poster: NC State 2016 Teaching and Learning Symposium, 2016.

[60] **S. Heckman**, J. King, "Teaching Software Engineering Skills in CS1.5: Incorporating Real-world Practices and Tools," Poster: 2016 SIGCSE Technical Symposium, 2016, p. 696-697.

[61] **S. Heckman**, "A Continuous Integration Framework for Promoting Software Engineering Best Practices," Poster: International Computer Education Research Conference, 2015.

[62] **S. Heckman**, "An Investigation of In-class Labs on Student Learning of Linear Data Structures," Poster: NC State 2015 Teaching and Learning Symposium, 2015.

[63] **S. Heckman**, J. King, M. Winters, "Automating Software Engineering Best Practices Using an Open Source Continuous Integration Framework," Poster: 2015 SIGCSE Technical Symposium, 2015, p. 677. Acceptance Rate: 44%.

[64] **S. Heckman,** "Integrating Communication Assessments into Undergraduate Computer Science Core Courses," Poster: NC State 2014 Teaching and Learning Symposium, 2014.

[65] E. Gehringer and **S. Heckman**, "Google Forms as an Enhanced Classroom Response System," Poster: NC State 2013 Teaching and Learning Symposium, 2013.

[66] **S. Heckman**, L. Layman, S. Thomas, L. Williams, T. Xie., "On Expediting Software Engineer AWAREness of Anomalous Code," Poster: Center for Advanced Computing and Communication and IBM University Day, 2006.

[67] **S. E. Smith**, L. Williams, and J. Xu, "Continuous Checking of Static Analysis and Automated Unit Test for Java Programs," Poster: Center for Advanced Computing and Communication and IBM University Day, 2005 – 2006.

[68] **S. E. Smith**. "Collaborative Courseware Development," Poster: The 13th Annual NC State University Undergraduate Research Symposium, 2004.

Other Papers

[69] **S. Heckman**, K. Stolee, C. Parnin, "10+ Years of Teaching Software Engineering with iTrust: the Good, the Bad, and the Ugly," SPLASH-E, 2018, no conference proceedings, unpublished.

[70] **S. S. Heckman**, "Adaptively Ranking Alerts Generated from Automated Static Analysis," Institute for Software Research (ISR) Graduate Student Research Symposium (GSRS), University of California, Irvine, June 1, 2007.

Assignments

[71] **Sarah Heckman**, "Testing the Java Collections Framework," *EngageCSEdu*, https://www.engage-csedu.org/find-resources/testing-java-collections-framework

[72] **Sarah Heckman**, "Black Box Test Plan - Bug Hunt," *Incorporating Communication Outcomes into the Computer*

Science Curriculum, accessed May 29, 2014, http://cs-comm.lib.muohio.edu/items/show/16.

[73] **Sarah Heckman**, Ed Gehringer, "Design Proposal and Rationale," *Incorporating Communication Outcomes into the Computer Science Curriculum*, accessed May 29, 2014, http://cs-comm.lib.muohio.edu/items/show/38.

Invited Presentations, Judge, & Panelist

- Panelist, INTech Foundation Middle School Girls Summer Camp, 2017
- Panelist, Middle School Girls Gaming Camp, July 2014 and 2016
- Panelist, WiCS Grad School Panel, April 11, 2014.
- Judge, WiCS Symposium, April 4, 2014.
- Panelist, SHE++ Documentary Screening and Panel Discussion, WiCS, November 2014. (http://lib.ncsu.edu/event/she-documentary-screening-and-panel-discussion)
- Speaker, "Computer Science and You," NC State CSC Girls Gaming Camp, July 2013.
- Speaker, "Pair Programming", University of Virginia Tapestry Workshop, June 2012.
- Panelist, CRA-W Panel Discussion, WiCS, November 2011.
- Panelist, Graduate Experiences, CSC GSA, November 2009.
- Speaker, Research Ethics Education: Beyond RCR Training, "OpenSeminar in Research Ethics: A web-based REE course," with D. Edelman, Raleigh, NC, USA, April 2007.
- Speaker, EDUCAUSE NLII (now ELI) 2005 Spring Focus Session, Emerging Practices and Learning Technologies, "What Students Say About Emerging Practices and Learning Technology," with A. Potoczniak, Rice University, Houston, TX, USA, March 2005.

Funding – Career Total $5,389,634

Sponsored Grants – Total $4,930,494

- **S. Heckman**, "Collaborative Research: Building High-Quality K-12 CS Education Research Capacity Across an Outcome Framework of Equitable Capacity, Access, Participation, and Experience," National Science Foundation (NSF), 9/1/2021 – 8/31/2024, $114,823 in first year with total $202,645 over 3 years.
- D. Reeves and **S. Heckman**, "SFS: A Cybersecurity Educational Partnership for the Government Workforce," National Science Foundation (NSF) DGE, 1/1/2020 – 12/31/2024, $980,975 in first year with total of $2,748,558 over 5 years.
- **S. Heckman**, T. Battestilli, A. Howard, "CUE: Collaborative Research: Effective Peer Teaching Across Computing Pathways, National Science Foundation (NSF), IUSE: CUE 19-546, 1/1/2020 – 6/30/2022, $98,987. (Note: This is a collaborative proposal between 10 PIs/Senior Personal at Duke University, University of North Carolina – Chapel Hill, and the University Florida. The total request is for ~$300K. NC State is the lead institution on the collaborative proposal.)
- C. F. Lynch, T. M. Barnes, S. Heckman, "Developing Integrated Teaching Platforms to Enhance Blended Learning in STEM," National Science Foundation, 10/1/2018 – 9/30/2021, $597,529.
- E. Murphy-Hill and **S. Heckman,** "SHF: Small: Enabling Scalable and Expressive Program Analysis Notifications," National Science Foundation, 8/15/2017 – 7/31/2020, $265,853.
- C. Parnin, E. Murphy-Hill, **S. Heckman**, "REU Site: Science of Software", 2/1/2016 – 1/31/2019, $355,365.
- **S. Heckman,** "Incorporation of Software Engineering Best Practices in CSC216", Google CS Engagement Award, Tides Foundation, 7/1/2015 – 1/31/2016, $5,000.
- **S. Heckman**, "Collaborative Research: Transforming Computer Science Education Research Through Use of Appropriate Empirical Research Methods: Mentoring and Tutorials", National Science Foundation, 9/1/2015 – 8/31/2021, $406,557 [Full Grant is: $1.31M]
- E. Murphy-Hill and **S. Heckman**, "SHF: Small: Expressive and Scalable Notifications for Program Analysis Tools," National Science Foundation, 10/1/2012 – 9/30/2014, $250,000.

Extension Grants – Total $15,800

- E. Youngsteadt, D. S. Carley, S. Heckman, "NC Pollinator Garden Design Website," 2019 Gore Innovative Grants, April 2019 – April 2020, $15,800.

Educational Grants – Total $84,115

- **S. Heckman,** K. Stolee, C. Parnin, "CSC326 Course Redesign – Creating an Agile Course to Support Software Engineering Process," DELTA Course Redesign Grant, July 2017 – June 2018, $36,400 + $9,500 supplement.
- **S. Heckman**, "Incorporating Software Engineering Best Practices into CSC216," July 2015 – June 2016, $18,965 + $10,000 supplement.
- **S. Heckman**, "Bridging the Gap between CS1 & CS2: Flipping the CS1.5 Classroom," Office of Faculty Development Summer Institute on the Scholarship of Teaching and Learning Grant, July 2014 – June 2015, $1,250.
- E. Gehringer and **S. Heckman**, "A Classroom Response System Using Google Apps," DELTA IDEA Grant, September 2011 – June 2012, $8,000.

Awards – Total $346,175

- **S. Heckman**, "Research Triangle Peer Teaching Fellows: Scalable Evidence-Based Peer Teaching for Improving CS Capacity and Diversity," Sub Award from Duke University as part of Google CS Capacity Award, 7/1/2015 – 6/30/2018, $346,175.77. In collaboration with Duke University, University of North Carolina – Chapel Hill, and University of Florida.

Gifts in Kind – Total $13,050

- **S. Heckman**, "Real-World, Socially-Relevant Mobile Application Development in CS2" (30 Motorola Droids), Google, Inc., 2010, 30 Motorola Droids, $13,050.

Professional Service

Technical Symposium on Computer Science Education (SIGCSE TS) – Organizing Committee

- Steering Committee, 2021-present
- Registration Team, 2021, 2022
- Senior Program Chair, 2020
- Program Chair, 2019
- Posters Track Chair, 2018
- Demos Track Chair, 2017
- Student Volunteers Coordinator, 2015-2017
- Affiliated Events Coordinator, 2013
- Local Arrangements, 2012

Journal Guest Editor

- Guest Editor, Transactions on Computing Education, Special Issue on Capstones, 2016-2017

Reviewing

- Reviewer, ACM International Computing Education Research Conference (ICER), 2020-2021
- Invited Reviewer, *Empirical Software Engineering*, 2021
- Associate Program Committee (APC), Technical Symposium on Computer Science Education, 2017, 2021, 2022
- Invited Reviewer, Security and Communications Network, 2015
- Invited Reviewer, *International Journal of Artificial Intelligence in Education* (IJAIED), 2015
- Member, National Science Foundation proposal review panel, 2012
- Invited Reviewer, *Software: Practice and Experience*, 2014

- Reviewer, Conference on Innovation and Technology in Computer Science Education (ITiCSE), 2010-2014,2017
- Reviewer, Technical Symposium on Computer Science Education (SIGCSE TS), 2010-2014
- Reviewer, International Conference on Software Engineering (ICSE) Software Engineering Education Track (SEE), 2013
- Invited Reviewer, *Information and Software Technology* (IST), 2012
- Reviewer, Grace Hopper Celebration of Women in Computing, PhD Forum, 2011
- Reviewer, American Society for Engineering Education (ASEE) Software Engineering Constituent Committee (SwECC), 2010
- Reviewer, Grace Hopper Celebration of Women in Computing, 2010

Professional Organizations

- Senior Member, Association for Computing Machinery (ACM), 2006-present
- Senior Member, Institute of Electrical and Electronic Engineers (IEEE), 2006-present

University Service

- University Course and Curriculum Committee, 2021-2024
- Director of Undergraduate Programs, Department of Computer Science, 2018-present
- Assistant Director of Undergraduate Programs, Department of Computer Science, 2016-2018
- Accreditation Co-Coordinator, 2017-2018
- Contributor, University TA Training, 2017
- Coordinator, COE Graduate TA Training, 2015-2016
- Member, CSC Department Task Forces (Undergraduate Research, Strategic Plan Actionable Goals, Curriculum Tracks, Broadening Participation), 2015- present
- Member, Undergraduate Curriculum Committee, 2010-present
- Advisor, ACM/AITP Student Chapter, 2010-2015
- Member, Computer Steering Committee, 2013-present
- Instructor, College of Engineering Summer Programs for High School, 2011, 2012, 2014, 2015
- Member, Teaching Assistant Professor Hiring Committee, 2011, 2012, 2014, 2015
- Instructor, COE Graduate TA Training Extended Workshop on TA'ing Courses with Computer Intensive Assignments, 2012, 2013, 2014
- Co-instructor, COE Graduate TA Training, 2012-2013
- Facilitator, Workshop for visiting High School Computer Science Students, 2012
- Member, Lab Coordinator Hiring Committee, 2009
- Member, Web Redesign Committee, 2009
- CSC Service Lab Co-coordinator, 2009