Kelly Rivers

Associate Teaching Professor, CSD, Carnegie Mellon University
Gates 4109 • 5000 Forbes Ave. • Pittsburgh, PA 15213
phone: (412) 268-2032 • email: krivers@cs.cmu.edu • website: www.krivers.net

Education

Ph.D.	**Human Computer Interaction**	Carnegie Mellon University	2017
M.S.	**Human Computer Interaction**	Carnegie Mellon University	2015
B.S.	**Mathematics and Computer Science**	Carnegie Mellon University	2011

Faculty Appointments

Associate Teaching Professor	Carnegie Mellon University	2023-Present
Assistant Teaching Professor	Carnegie Mellon University	2017-2023

Teaching Interests

Keywords: introductory courses; alignment; active learning; equitable policies

Summary: I primarily teach introductory computer science courses where students are engaging with a field of study for the first time. In recent years this has included 15-110 (introduction to computer science), 15-112 (introduction to programming), and Designing Human-Centered Software (introduction to human-computer interaction). I use educational design that aligns goals, assessment, and instruction to ensure all course materials are synchronized and support each other, and to provide clear motivation for why each new piece of material is important to learn. My instruction integrates lectures with several active learning components, such as live collaborative coding, 'clicker' quizzes, think-share-pair activities, and in-class problem solving. I support diversity, equity, and inclusion in my classes through diverse examples, equitable policies, and inclusive classroom practices.

Research Interests

Keywords: computer science education; data-driven feedback; educational technology

Summary: I develop educational tools that use student learning data to improve the learning process for students and teachers. My graduate work on data-driven tutoring used student programming submissions to automatically generate next-step hints for future students working on programming problems. My current work builds practical tools to provide formative feedback based on student work.

Kelly Rivers

Teaching Experience

S'24	15-110	Principles of Computing	with Franceska Xhakaj
S'24	07-070	Teaching Techniques for Computer Science	with Charlie Garrod
F'23	15-110	Principles of Computing	with Anne Kohlbrenner
F'23	07-070	Teaching Techniques for Computer Science	with Charlie Garrod
S'23	15-110	Principles of Computing	
F'22	15-110	Principles of Computing	with Franceska Xhakaj
S'22	15-110	Principles of Computing	with Franceska Xhakaj
S'22	05-391-C/ 05-891-C	Designing Human-Centered Software	
F'21	15-110	Principles of Computing	with Franceska Xhakaj
S'21	15-110	Principles of Computing	
F'20	15-110	Principles of Computing	with David Touretzky
S'20	15-110	Principles of Computing	with Margaret Reid-Miller
F'19	15-110	Principles of Computing	with Stephanie Rosenthal
S'19	15-112	Fundamentals of Programming and Computer Science	with Michael Taylor
F'18	15-112	Fundamentals of Programming and Computer Science	with Michael Taylor
S'18	15-112	Fundamentals of Programming and Computer Science	with Martin Carlisle
F'17	15-112	Fundamentals of Programming and Computer Science	with Ryan Riley
F'16	15-110	Principles of Computing	with Margaret Reid-Miller
F'14	05-410	User-Centered Research & Evaluation	TA for Jim Morris
F'13	05-433-B	User Interface Lab (Section B - GUI)	TA for Anind Dey
S'13	15-112	Fundamentals of Programming and Computer Science	with David Kosbie

Honors and Awards

- Provost's Inclusive Teaching Fellowship 2021-2022
- Program for Interdisciplinary Education Research 2011-2016
- Science and Humanities Scholar 2007-2011
- Carnegie Mellon Senior Leadership Recognition 2011

Service

Outreach

- CMU Computer Science Scholars Instructor 2021-2023
- CMU Summer Academy for Math and Science Instructor 2018-2019

Committees

- SCS Teaching-Track Faculty Meeting Organizer 2022-2024
- SCS Undergraduate Review Committee 2020-2024
- CSD DEI Committee 2020-2023
- CSD Hiring Committee 2019-2021
- Head of SCS Teaching Awards Committee 2014; 2022
- SCS Teaching Awards Committee 2019-2020
- CSD TA Committee 2013-2018
- HCI PhD Admissions Committee 2015

Reviewer (Conferences)

- SIGCSE 2013-2023
- CSEDM 2020-2022
- CHI 2017
- EDM 2015, 2017
- AIED 2013

Reviewer (Fellowships)

- NCWIT 2011-2015

Other

- AP Reader for CS Principles 2023
- Guest Editor (IJAIED) 2019-2020

Other Research and Industry Experience

- Course designer for Emeritus course Programming in Python w/ Anil Ada 2021
- Google Software Engineering Intern Summer 2014
- Autolab Frontend Developer 2010-2012
- Pittsburgh Science of Learning Center Intern Summer 2010
- Undergraduate Research Assistant Fall 2009

Journal Papers

1. Rivers, K. & Koedinger, K.R. (2015). Data-Driven Hint Generation in Vast Solution Spaces: A Self-Improving Python Programming Tutor. *International Journal of Artificial Intelligence in Education*, 1-28.

Conference Publications

1. Price, T., Hovemeyer, D., Rivers, K., Gao, G., Bart, A., Kazerouni, A., Becker, B., Petersen, A., Gusukuma, L., Edwards, S., Babcock, D.. (2020) Progsnap2: A flexible format for programming process data. In *Proceedings of the 2020 ACM Conference on Innovation and Technology in Computer Science Education*. pp 356-362.
2. Rivers, K., Harpstead, E., and Koedinger, K. (2016) Learning Curve Analysis for Programming: Which Concepts do Students Struggle With? In *Proceedings of the 2016 ACM Conference on International Computing Education Research*. pp 143-151.
3. Ihantola, P., Vihavainen, A., Ahadi, A., Butler, M., Börstler, J., Edwards, S., Isohanni, E., Korhonen, A., Petersen, A., Rivers, K., Rubio, M., Sheard, J., Skupas, B., Spacco, J., Szabo, C., Toll, D. (2015). Educational Data Mining and Learning Analytics in Programming: Literature Review and Case Studies. In *Proceedings of the 2015 ITiCSE on Working Group Reports*. pp. 41-63.
4. Rivers, K. & Koedinger, K.R. (2014). Automating Hint Generation with Solution Space Path Construction. In *Proceedings of the 12th International Conference on Intelligent Tutoring Systems*. pp. 329-339.
5. Rivers, K. & Koedinger, K.R. (2013). Automatic Generation of Programming Feedback: A Data-Driven Approach. In *Proceedings of the Workshops at the 16th International Conference on Artificial Intelligence in Education AIED 2013*. pp. 50-59.
6. Spacco, J., Fossati, D., Stamper, J. & Rivers, K. (2013). Towards improving programming habits to create better computer science course outcomes. In *Proceedings of the 18th ACM conference on Innovation and technology in computer science education*. pp. 243-248.
7. Sudol, L.A., Rivers, K. & Harris, T. (2012). Probabilistic Distance to Solution in a Complex Problem Solving Domain. In *Proceedings of the 5th International Conference on Educational Data Mining.* pp. 144-147.

Other Publications

1. Olney, A. M., Gilbert, S. G., Rivers, K. (2021). Preface to the Special Issue on Creating and Improving Adaptive Learning: Smart Authoring Tools and Processes. In *International Journal of Artificial Intelligence in Education.* pp 1-3.
2. Price, T. W., Hovemeyer, D., Rivers, K., Bart, A. C., Petersen, A., Becker, B., & Lefever, J. (2019). ProgSnap2: A Flexible Format for Programming Process Data. In *Companion Proceedings 9th International Conference on Learning Analytics & Knowledge (LAK19)*.
3. Price, T. W., Brown, N. C., Piech, C., & Rivers, K. (2017). Sharing and Using Programming Log Data. In *Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education.* pp. 729-729.
4. Rivers, K. (2015). Designing a Data-Driven Tutor Authoring Tool for CS Educators. In

Proceedings of the eleventh annual International Conference on International Computing Education Research. pp. 277-278.

5. Rivers, K. and Koedinger, K. (2014). Open-Ended Tutoring for Programming: Building Next-Step Hints into an Online Development Environment. At *the Second Workshop on AI-supported Education for Computer Science (AIEDCS)*.
6. Rivers, K. (2014). Automating Hint Generation with Solution Space Path Construction. At the *Seventh Annual inter-Science of Learning Center Student and Post-doc Conference*.
7. Hovemeyer, D., Hertz, M., Denny, P., Spacco, J., Papancea, A., Stamper, J., & Rivers, K. (2013). CloudCoder: building a community for creating, assigning, evaluating and sharing programming exercises. In *Proceeding of the 44th ACM technical symposium on Computer science education*. pp. 742.
8. Rivers, K. & Koedinger, K.R. (2012). A Canonicalizing Model for Building Programming Tutors. In *Proceedings of the 11th International Conference on Intelligent Tutoring Systems*. pp. 591-593.