Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
SCHOOL OF INFORMATION
COLLEGE OF ENGINEERING

Barbara J. Ericson, assistant professor of information, School of Information, and assistant professor of electrical engineering and computer science, College of Engineering, is recommended for promotion to associate professor of information, with tenure, School of Information, and associate professor of electrical engineering and computer science, without tenure, College of Engineering.

Academic Degrees:

Ph.D.	2018	Georgia Institute of Technology, Atlanta, Georgia
M.S.	1986	University of Michigan, Ann Arbor, Michigan
B.S.	1983	Wayne State University, Detroit, Michigan

Professional Record:

2020 – Present	Assistant Professor of Electrical Engineering and Computer Science, College of Engineering, University of Michigan
2018 – Present	Assistant Professor of Information, School of Information, University of Michigan

Summary of Evaluation:

Teaching: Professor Ericson's teaching philosophy is rooted in the idea that everyone can learn to program. Her teaching is informed by theories of cognitive load, computing identity, and social constructivism. Her approaches are geared towards promoting learner self-efficacy through early success. Professor Ericson employs active learning and teaching methods, de-emphasizes lecture in favor of hands-on assignments and peer instruction through questions, and through guided inquiry (specifically Process-Oriented Guided Inquiry Learning). Professor Ericson has also employed the Runestone eBook platform in much of her instruction, and through this approach uses Parsons problems, which dovetails with her research agenda. She has adapted best practices from computing education research to improve her own teaching and has consulted with the Center for Research on Learning and Teaching to improve her courses.

Professor Ericson has taught Data Oriented Programming (SI 206) in every term since arriving at Michigan. This is a second-level Python course required for all students in the University of Michigan School of Information (UMSI) Bachelor of Science in information (BSI) program. Professor Ericson works hard to include students in her scholarship and its public-facing elements, creating valuable experiences for students at all levels. She works with her students to create opportunities for research and publication and allows them a lot of freedom in how they frame their investigations within the larger framework of her research into computing education research. Since joining UMSI in 2018, Professor Ericson has served on three doctoral committees and has been the primary advisor or co-advisor nine Ph.D. students. Two of her Ph.D. students have graduated. One is now an assistant professor of computer science at the University of Illinois and the other is a post-doctoral scholar at Carnegie Mellon. She has worked with six master's students and has been heavily engaged with undergraduate mentoring.

Research: Professor Ericson is a leading scholar in computing education, with a focus on expanding access to computing by developing techniques that support learning to code for diverse audiences.

Her research has focused on developing new or improved pedagogies and pedagogical tools for computer science and working to increase the availability of high-quality learning opportunities in computing. This has included the development of interactive eBooks for learners, and research on "the best teaching and learning methods" for novice programmers. This latter focus includes research on adaptive Parsons problems that use mixed-up code blocks that need to be reassembled by the learner, and "Purpose First" programming which focuses on "brief, authentic, and purpose-driven learning" in domains with relevance to the learner. Professor Ericson's research on Parsons problems is well-recognized and established within the field of computer science education and she has been invited to speak internationally, lead webinars and workshops, and to give interviews about key topics in her work.

Professor Ericson regularly collaborates on publications with colleagues across her field. Since joining UMSI in 2018, she has co-authored four books on programming in a variety of computer languages, published one article in a peer-reviewed journal, and published 19 articles in conference publications. Within the computer science education community her work is well-recognized and highly visible having been published most frequently in the "heavily reviewed" Association for Computing Machinery (ACM) conference proceedings, including the ACM Conference on Human Factors in Computing Systems (CHI) and a range of more focused conferences on computer science education. In addition to conference proceedings papers, Professor Ericson has published in widely-read outlets like *Communications of the ACM* and peer-reviewed journals such as *ACM Inroads* and *ACM Transactions on Computer Education (TOCE)*. Professor Ericson has been active in pursuing external funding since arriving at Michigan, submitting 18 different proposals and receiving funding for eight of them. This includes a prestigious Faculty Early Career Development Program (CAREER) award from the National Science Foundation (NSF) in 2022.

<u>Recent and Significant Publications:</u>

Kazemitabaar, M., Chow, J., Ka To Ma, C., Ericson, B., Weintrop, D., and Grossman, T. (2023). "Studying the effect of AI Code Generators on Supporting Novice Learners in Introductory Programming." *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23)*. Association for Computing Machinery, New York, NY, USA, Article 455, 1–23. https://doi.org/10.1145/3544548.3580919

Ericson, B., Denny, P., Prather, J., Duran, R., Hellas, A., Leinonen, J., Miller, C., Morrison, B., Pearce, J., and Rodger, S. (2022). "Parsons Problems and Beyond: Systematic Literature Review and Empirical Study Designs." *Proceedings of the 2022 Working Group Reports on Innovation and Technology in Computer Science Education (ITiCSE-WGR '22)*. Association for Computing Machinery, New York, NY, USA, 191–234. https://doi.org/10.1145/3571785.3574127

Haynes, C. C. and Ericson, B. (2021). "Problem-Solving Efficiency and Cognitive Load for Adaptive Parsons Problems vs. Writing the Equivalent Code." *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21)*. Association for Computing Machinery, New York, NY, USA, Article 60, 1–15. https://doi.org/10.1145/3411764.3445292

Haynes, C.C., and Ericson, B. (2021). "Problem-Solving Efficiency and Cognitive Load for Adaptive Parsons Problems vs. Writing the Equivalent Code." *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, 15-26. https://doi.org/10.1145/3501385.3543977

Cunningham, K., Ericson, B., Agrawal Bejarano, R., Guzdial, M. (2021). "Avoiding the Turing Tarpit: Learning Conversational Programming by Starting from Code's Purpose." *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI*

'21). Association for Computing Machinery, New York, NY, USA, Article 61, 1–15. https://doi.org/10.1145/3411764.3445571

Service: Professor Ericson has provided solid service within UMSI, and exemplary service both to her broader academic community and to the broader public. Within UMSI, she has served on the Lecturer Review Committee, on the Presidential Post-doctoral Fellowship Program's Standing Search Committee, and on the Diversity, Equity, and Inclusion Committee. Beyond her formal committee assignments, Professor Ericson also contributed to the Community College Summer Institute and volunteered to co-lead the Michigan Interactive and Social Computing speaker series. Her service contributions external to the University of Michigan are extensive. She serves as a member of the editorial board for *ACM TOCE* and has served on the program committees for prominent conferences in her field. She reviews for prominent journals and conferences and has served on review panels for the NSF. She is highly engaged in the Sisters Rise Up and Rise Up 4 CS programs and has also served for multiple years on the selection committee for the Michigan Aspirations in Computing awards, organized by the NSF's Broadening Participation in Computing Alliance and the National Center for Women and Information Technology. Professor Ericson was named an ACM Distinguished Member for "Outstanding Educational Contributions to Computing" in 2020 and was recognized with the ACM SIGCSE Award for Outstanding Contributions to Computer Science Education in 2022.

External Reviewers:
Reviewer A: "I consider [Professor] Ericson's work to have exceptionally high impact among both researchers and teachers, which is hard to achieve...she is closing the gap between research and practice in technology-enabled [computer science] education at a time when well-researched tools to expand the reach of [computer science] education are in dire need."

Reviewer B: "[Professor] Ericson has served as a reviewer for major computer science education conferences for many years, as well as a reviewer for *TOCE*. In addition, she was associate editor for *TOCE*. She has received service awards for her work running outreach summer camps and providing professional development for teachers in Georgia Computers! In addition, she has been a grader for the College Board [Advanced Placement] Test for years. Her level of service is far beyond someone being put up for tenure."

Reviewer C: "Her name is synonymous with pioneering work in the field, and her influence is widely recognized among our shared colleagues and within the broader academic community."

Reviewer D: "['Studying the effect of AI Code Generators on Supporting Novice Learners in Introductory Programming'] will certainly be a heavily cited paper, as it is one of (if not the) earliest papers investigating the topic of [artificial intelligence (AI)]-supported code generation and learning. I myself will be using this paper in my fall class on computer science education. This is a well-designed study that looks at how integrating an AI-supported coding tool into a platform impacts student learning in introductory computing…. This will be a seminal paper."

Reviewer E: "While it can be difficult to judge the visibility of someone coming up for tenure, in Barb's case it's easy: she has had international visibility even as a graduate student, and I don't think it has diminished. …[at my institution] we have never tenured or even hired a person in computing education research. However, I think her overall record (not just her papers but also her software, service, visibility, etc.) makes her a clear case for tenure at a place like Michigan or [my institution]."

Reviewer F: "I felt the novelty of the approach and empirical backing for who benefits from the purpose-first approach to be groundbreaking and a major contribution to the field of computer science education, especially as we increasingly require more people to have conversational fluency with coding from many even if they do not need to be the coders/hackers themselves. That she supported this effort led by a student /postdoc speaks positively to her willingness to generously support others in shaping computer science for the future."

Reviewer G: "[Professor] Ericson's teaching record is extremely strong in quantity and quality. She has won multiple awards, and has a long history at this point. It is not surprising that someone who cares enough to create great materials also comes across well in the classroom, since her concern for student success is clearly authentic."

Reviewer H: "Professor Ericson is the Parsons Problem person. Her work in this area has been transformational in developing a strong research base to rigorously understand their use, innovating in the content (e.g., adaptive and micro versions), and drawing attention to the pedagogical tool of Parsons Problems for Educators. …Professor Ericson simply can't be compared to other pre-tenure faculty. Her prominence and impact within the field far exceed what could possibly be expected for a pre-tenure faculty member."

Reviewer I: "This work has impacted my own research and teaching in a number of ways. First, we've adapted some of her techniques for the [computer science] 1 course that I teach. For example, I learned about her idea for micro Parsons problems this summer and we'll be rolling out some of those in my class this Fall."

Summary of Recommendation:
Professor Ericson is a leading scholar in computing education, with a focus on expanding access to computing by developing techniques that support learning to code for diverse audiences. Her teaching embodies her scholarship, and she is a successful mentor. Her service contributions to the field and to the public are extensive, having furthered both our understanding of diversity in computer science education and helping to expand diversity within the field. Therefore, with the support of the Promotion and Tenure Committee of the School of Information and the Executive Committee at the College of Engineering, we recommend Barbara J. Ericson for promotion to associate professor of information, with tenure, School of Information and associate professor of electrical engineering and computer science, without tenure, College of Engineering.

Andrea Forte
Dean, School of Information

Steven L Ceccio, Ph.D.
Interim Dean
Vincent T. and Gloria M. Gorguze Professor of Engineering
College of Engineering

May 2024