Hammad **Ahmad**

Assistant Teaching Professor
Software and Societal Systems Department, Carnegie Mellon University
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Education

University of Michigan, Ann Arbor
Ph.D. Computer Science and Engineering — *2019 – 2024*
Advisor: Westley Weimer

University of Michigan, Ann Arbor
M.S. Computer Science and Engineering (GPA: 4.0/4.0) — *2019 – 2021*

Washington and Lee University
B.S. Computer Science with Honors (*summa cum laude*, GPA: 3.96/4.0) — *2015 – 2019*
Advisor: Sara Sprenkle

Teaching

3 courses taught as instructor of record across two institutions, with 5 additional semesters of teaching assistant experience and an outstanding teaching award. Copies of student teaching evaluations (including quantitative and qualitative assessments) available at `https://hammadahmad.io/teaching/`.

Instructor of Record Experience

CSCI 111: Fundamentals of Programming (4 credits) — *Washington and Lee University*
Adjunct Professor of Computer Science — *Fall '22*
Introductory-level course focusing on programming constructs and problem solving using Python. 3 credit lecture section with an associated 1 credit lab. 20 students enrolled. [Aggregated student evaluation measures not reported by school.]

CSCI 317: Database Systems (3 credits) — *Washington and Lee University*
Adjunct Professor of Computer Science — *Fall '22*
Upper-level elective course focusing on the fundamentals of database design, relational algebra and the description and semantics of query languages. 17 students enrolled. [Aggregated student evaluation measures not reported by school.]

EECS 281: Data Structures and Algorithms (4 credits) — *University of Michigan*
Faculty Instructor — *Winter '22*
Intermediate-level core course focusing on data representation, algorithmic design, and asymptotic complexity analysis. Taught 1 of 6 sections; 872 students enrolled (150 in Ahmad's section). [Median student evaluation: 4.5/5]

Teaching Assistant Experience

EECS 481: Software Engineering — *University of Michigan*
Graduate Student Instructor — *Fall '20, Winter '21*
Upper-level elective course focusing on key software engineering concepts. Taught two discussion sections for a total of two contact hours per week. Section sizes ranged from 10 to 25 students. **Received an outstanding teaching award** (awarded to 3 recipients out of 368). [Median student evaluation: 4.8/5.0 and 4.9/5.0 for Fall '20 and Winter '21 respectively]

CS 111: Fundamentals of Programming I — *Washington and Lee University*
Lab Teaching Assistant — *Winter '19*
Introductory-level course focusing on problem solving using Python. Assisted with weekly lab sessions (three contact hours per week).

CS 112: Fundamentals of Programming II — *Washington and Lee University*
Lab Teaching Assistant — *Fall '18, Winter '19*
Intermediate-level course focusing on data structures and problem solving using Python. Assisted with weekly lab sessions (three contact hours per week).

Peer-Reviewed Publications

10 publications: 7 conference papers (2xICSE, PROMISE, PPSN, ATC, ASPLOS, HSCC), 1 journal manuscript (TSE), 2 workshop papers (Genetic Improvement at ICSE, Student Workshop at GECCO). 3 publications with undergraduate and pre-doctoral mentees. † denotes a mentee co-author.

Causal Relationships and Programming Outcomes: A Transcranial Magnetic Stimulation Experiment
Hammad Ahmad, Madeline Endres, Kaia Newman, Priscila Santiesteban†, Emma Shedden†, Westley Weimer. *International Conference on Software Engineering (ICSE'24)*. **[ACM Distinguished Paper Award]** [22% acceptance rate]

CirFix: Automated Hardware Repair and its Real-World Applications
Priscila Santiesteban†, Yu Huang, Westley Weimer, **Hammad Ahmad**. *Transactions on Software Engineering (TSE)*. [9.322 impact factor]

How Do We Read Formal Claims? Eye-Tracking and the Cognition of Proofs about Algorithms
Hammad Ahmad, Zachary Karas†, Kimberly Diaz, Amir Kamil, Jean-Baptiste Jeannin, Westley Weimer. *International Conference on Software Engineering (ICSE'23)*. [26% acceptance rate]

LOGI: An Empirical Model of Heat-Induced Disk Drive Data Loss and its Implications for Data Recovery
Hammad Ahmad, Colton Holoday, Ian Bertram, Kevin Angstadt, Zohreh Sharafi, Westley Weimer. *Predictive Models and Data Analytics in Software Engineering (PROMISE'22)*.

Digging into Semantics: Where do search-based software repair methods search?
Hammad Ahmad, Padraic Cashin, Stephanie Forrest, Westley Weimer. *Parallel Problem Solving from Nature (PPSN'22)*.

Sift: Using Refinement-guided Automation to Verify Complex Distributed Systems
Haojun Ma, **Hammad Ahmad**, Aman Goel, Eli Goldweber, Jean-Baptiste Jeannin, Manos Kapritsos, Baris Kasikci. *USENIX Annual Technical Conference (ATC'22)*. [16% acceptance rate]

CirFix: Automatically Repairing Defects in Hardware Design Code
Hammad Ahmad, Yu Huang, Westley Weimer. *Architectural Support for Programming Languages and Operating Systems (ASPLOS'22)*. [20% acceptance rate]

Applying Automated Program Repair to Dataflow Programming Languages
Yu Huang, **Hammad Ahmad**, Stephanie Forrest, Westley Weimer. *Genetic Improvement Workshop at the International Conference on Software Engineering (GI @ ICSE'21)*.

A Program Logic to Verify Signal Temporal Logic Specifications of Hybrid Systems
Hammad Ahmad and Jean-Baptiste Jeannin. ACM *International Conference on Hybrid Systems: Computation and Control (HSCC'21)*. [35% acceptance rate]

A comparison of semantic-based initialization methods for genetic programming
Hammad Ahmad and Thomas Helmuth. *Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO'18)*.

Mentorship

Undergraduate Mentees

- **Zachary Karas** (2021 – 2022) [moved on to Vanderbilt for a Computer Science Ph.D. program]
- **Joshua Velten** (2022 – 2024)
- **Emma Shedden** (2023 – 2024) [moved on to UPenn for a Computer Science Ph.D. program]

Pre-Doctoral Mentees

- **Priscila Santiesteban** (2021 – present)

Professional Development

Preparing Future Faculty Program *University of Michigan*
Rackham Graduate School, University of Michigan *May 2023 – June 2023*
Completed a nationally-recognized 5-week program (4 hours per week) designed to help prepare doctoral candidates for success in their future faculty positions, with an emphasis on course design and equity-focused teaching.

Workshop on Inclusive Teaching for Graduate and Undergraduate Student Instructors *University of Michigan*
Department of Computer Science and Engineering, University of Michigan *March 2021*
Attended a workshop focusing on language and interactions that support inclusion and equity in the class.

Graduate Teacher Certificate Program *University of Michigan*
Center for Research on Learning and Teaching, University of Michigan *August 2020 – August 2023*
Completed a certificate program for graduate students focusing on developing teaching skills. Includes professional development workshops (about 15 hours total), instructional practice experience (at least two semesters of teaching) and associated reflection, and mentorship.

Service

IEEE Transactions on Computer-Aid Design of Integrated Circuits and Systems (TCAD)
Journal Reviewer *May 2023, August 2023*

International Conference on Computer-Aided Verification (CAV '21)
Shadow-PC Member *February 2021*

Funding and Grants

$8,000 **National Science Foundation REU Supplement**, awarded to support one undergraduate student for research and mentorship.
$1,400 **University of Michigan, Rackham Travel Grant**, awarded for international travel to SIGCSE'23.
$1,400 **University of Michigan, Rackham Travel Grant**, awarded for international travel to ASPLOS'22.

Honors & Awards

2021 **CSE Winter'21 Graduate Student Instructor Award (3/368 recipients)**, University of Michigan
2019 **Computer Science Award**, Washington and Lee University
2015-19 **President's List**, Washington and Lee University
2017 **Phi Beta Kappa Academic Honors Society**, Washington and Lee University

Software Tools

ChemTutor: A Place to Practice Chemistry *chemtutor.wlu.edu/*
Lead Developer
An instructional tool offering Chemistry students to learn by watching instructional videos and doing practice problems. Used by hundreds of students across multiple institutions.

Ancient Graffiti Project *ancientgraffiti.org/Graffiti/*
Data Specialist
A digital resource for locating and studying handwritten inscriptions of the early Roman empire. Used by scholars to explore ancient wall inscriptions and to understand them in context.

References

Primary Reference: **Westley Weimer**
Professor of Computer Science, University of Michigan (weimerw@umich.edu)

Additional references available upon request.