MERIDIAN UNIVERSITY

Office of Faculty Affairs • Department of Computer Science

Dossier for Promotion to Associate Professor with Award of Tenure

Elena Rostova, Ph.D.

Assistant Professor of Computer Science

Case Summary. This dossier is submitted in support of Dr. Rostova's candidacy for promotion to the rank of Associate Professor with the award of tenure in the Department of Computer Science at Meridian University. It documents an integrated record of research, teaching, and service compiled over a six-year probationary period, and is organized into the five parts listed in the Table of Contents below, followed by a tabbed evidence appendix.

Candidate:	Elena Rostova, Ph.D. (Computer Science, Vertex Institute of Technology, 2020)
Primary Unit:	Department of Computer Science, College of Engineering
Action Requested:	Promotion to Associate Professor and Award of Tenure
Review Period:	August 15, 2020 – June 30, 2026
Proposed Effective Date:	July 1, 2027
Dossier Submitted:	October 1, 2026

Tenure Clock

8
Peer-Reviewed Publications, PI Period

512
Total Citations

$1.85M
External Research Funding

9
Distinct Course Preparations

4.6 / 5.0
Mean Teaching Evaluation

7
Graduate Students Advised

Contents

PART I

Research Contributions

Robust and efficient machine learning for real-world deployment

1 Overview of Research Program

Dr. Rostova's research program addresses a central tension in modern machine learning: models that perform well under laboratory conditions frequently degrade when deployed on distribution-shifted, resource-constrained, or adversarial real-world data. Since joining Meridian University in August 2020, she has built an independent, externally funded research program spanning two complementary threads: (i) robustness of learned models under distribution shift and federated data heterogeneity, and (ii) efficient neural architectures for edge and embedded deployment. This program has produced 8 peer-reviewed publications as principal investigator, attracted $1.85M in external funding across three awards, and established the Meridian Robust Systems Lab, which currently supports four doctoral students and two research staff.

1.1 Thread 1: Robustness under Distribution Shift

Standard supervised learning assumes training and evaluation data are drawn from the same distribution, an assumption regularly violated in deployed systems. In (Rostova and Jenkins, 2022), Dr. Rostova and collaborators introduced a federated aggregation scheme that remains stable when client data are non-identically distributed, improving worst-client accuracy by 11 percentage points over standard FedAvg baselines on clinical time-series benchmarks. This line of work was extended in (Rostova and Jenkins, 2021), which reduced per-round communication cost by 4.2$\times$ through a sparsified update protocol suitable for bandwidth-constrained hospital networks. Most recently, (Jenkins and Rostova, 2024) (with Dr. Sarah Jenkins) formalized a connection between distributional robustness and algorithmic fairness in decision-support systems, showing that robustness constraints alone are insufficient to guarantee equitable outcomes across protected subgroups without an explicit fairness regularizer.

1.2 Thread 2: Efficient Architectures for Edge Deployment

The second thread addresses the computational cost of deploying modern neural networks outside the data center. (Rostova et al., 2023) presented a neural architecture search procedure specialized for low-power edge devices, discovering architectures that matched hand-tuned baselines at 38% of the multiply-accumulate cost. (Rostova et al., 2024) generalized this approach to graph-structured data with SynapseNet, an adaptive graph neural network that adjusts its receptive field per-node at inference time; SynapseNet has since been adopted by three external research groups as a benchmark baseline. The 2025 extension (Rostova and Nandakumar, 2025) applies the same adaptive-receptive-field principle to anomaly detection in distributed sensor networks, reducing false-positive rates by 22% relative to fixed-topology graph convolutional baselines while running within the memory budget of commodity sensor-network gateways.

2 Significance and Independent Recognition

- **Best Paper Award**, Workshop on Machine Learning for Health (ML4H), 2021, for (Rostova and Jenkins, 2021).
- SynapseNet (Rostova et al., 2024) has been cited as a comparison baseline in 14 subsequent publications tracked by the department's bibliometric review as of June 2026.
- Invited talk, *Trustworthy and Efficient Learning Systems*, Apex Research Council Annual Symposium, 2024.
- Invited book chapter (Rostova and Carter, 2023) solicited by the editors of *Advances in Trustworthy Machine Learning* (Meridian University Press, 2023).

3 External Research Funding

Award Title	Role	Period	Amount
Early-Career Faculty Research Award, Apex Research Council	PI	2022–2027	$650,000
Synapse Foundation Grant for Trustworthy AI	Co-PI (with S. Jenkins)	2023–2026	$850,000
Rapid Innovation Award, Vertex Foundation	PI	2021–2022	$350,000
Total secured as PI or Co-PI			**$1,850,000**

4 Doctoral and Postdoctoral Mentorship

Dr. Rostova has advised or co-advised seven graduate students since 2020, three of whom have completed their doctorates.

Student	Role	Status	Placement / Year
Daniel Osei	Ph.D. advisee	Graduated	Nimbus Labs, 2024
Wei-Ling Zhao	Ph.D. advisee	Graduated	Apex Research Council, 2025
Fatima Al-Sayed	Ph.D. advisee	Graduated	Postdoc, Vertex Institute, 2026
Marcus Dubois	Ph.D. advisee	In progress	Expected 2028
Priya Nandakumar[1]	Ph.D. advisee	In progress	Expected 2027
Two additional students	Ph.D. advisees	In progress	Expected 2028–2029

PART II

Teaching Record

Curriculum development, classroom instruction, and graduate mentorship

5 Teaching Philosophy

Dr. Rostova's teaching is organized around a single premise: students retain systems concepts best when they are made to break something first. Lecture time is reserved for framing and worked derivations; laboratory time is spent debugging deliberately fragile implementations of the algorithms under discussion, from a federated averaging loop that diverges under heterogeneous clients to a pruned network that silently loses accuracy. This approach is applied consistently from the large introductory service course through the graduate seminar, scaled by the sophistication of the failure modes examined rather than by a change in pedagogical style.

6 Courses Taught

Course	Title	Level	Avg. Enrollment	Eval. (of 5.0)
CS 1100	Foundations of Programming	Undergraduate	214	4.3
CS 3410	Machine Learning Foundations	Undergraduate	96	4.6
CS 3415	Machine Learning Foundations Lab	Undergraduate	96	4.7
CS 4420	Distributed Systems	Undergraduate	58	4.5
CS 5510	Graph Neural Networks (Seminar)	Graduate	17	4.8
CS 5520	Robustness in Machine Learning (Seminar)	Graduate	14	4.9
CS 5901	Doctoral Research Colloquium	Graduate	22	4.5
		Mean across 12 offerings, 2020–2026		**4.6**

7 Curricular Development

[1] Co-advised with Dr. David Vance; also a co-author on (Rostova and Nandakumar, 2025).

- Designed CS 5520 *Robustness in Machine Learning* from scratch (2022), now a required elective for the department's machine-learning graduate track.
- Rebuilt the CS 3415 lab sequence around reproducible, containerized assignments after the prior version's environment-setup overhead was identified as the top source of student complaints in the 2021 course review.
- Co-authored the department's revised graduate qualifying-exam syllabus in systems and machine learning (2023), adopted department-wide.
- Supervised 11 undergraduate honors theses and 4 independent-study projects, three of which produced workshop publications with the student as lead author.

8 Representative Student Feedback

> *"The lab assignments in CS 3415 were the first time a class made me actually understand why federated learning is hard, instead of just why it's useful. I broke the aggregation code on purpose three times before I got it."*
> — Student evaluation, CS 3415, Fall 2024
>
> *"Professor Rostova runs office hours like a debugging session, not a lecture recap. I've never left with an unanswered question."*
> — Student evaluation, CS 5520, Spring 2025

9 Teaching Evaluation Summary

4.6 / 5.0	9	681
Overall Mean, 2020–2026	Distinct Preparations	Students Taught

PART III

Service

Departmental, university, and professional contributions

10 Departmental Service

- Member, Graduate Admissions Committee, Department of Computer Science (2021–2024); Chair (2023–2024), overseeing review of approximately 340 applications per cycle.

- Member, Faculty Search Committee for the Machine Learning Systems cluster hire (2022–2023), resulting in two successful offers.
- Departmental Colloquium Coordinator (2021–present), scheduling and hosting 6–8 external speakers per academic year.
- Co-author of the department's revised graduate qualifying-exam syllabus (see Part II).

11 University Service

- Member, College of Engineering Committee on Research Computing Infrastructure (2023–present), advising on GPU cluster allocation policy.
- Faculty mentor, Meridian University Women in Computing chapter (2021–present).
- Panelist, Meridian University Postdoctoral Research Symposium (2022, 2024).

12 Professional Service

- Program Committee member: International Conference on Machine Learning (ICML), 2022–2026; Conference on Neural Information Processing Systems (NeurIPS), 2023–2025; International Conference on Learning Representations (ICLR), 2024–2026.
- Reviewer: *Journal of Machine Learning Research*, *IEEE Transactions on Computers*, *ACM Transactions on Sensor Networks* (2021–present), averaging 12 manuscript reviews per year.
- Guest co-editor, special issue on Federated and Decentralized Learning, *ACM Transactions on Interactive Intelligent Systems* (2025), with Dr. Sarah Jenkins.
- Session chair, Workshop on Machine Learning for Health (ML4H), 2022 and 2023.

13 Outreach and Broader Impact

- Founded and continues to run *Models That Fail*, a public lecture series at Meridian University introducing distribution-shift and robustness concepts to non-specialist audiences; nine sessions since 2022 with a combined attendance of approximately 640.
- Volunteer instructor, Meridian regional high-school computing outreach program (2021–present), leading annual one-day workshops on introductory machine learning for underrepresented students.
- Open-source maintainer of the `robustfed` library used to implement the aggregation methods described in (Rostova and Jenkins, 2022) and (Rostova and Jenkins, 2021), with contributions from four external research groups.

PART IV

Publication Record

14 Bibliometric Summary

The figures below reflect the review period (August 2020 – June 2026) and are drawn from the department's annual bibliometric report, cross-checked against publisher records at the time of dossier compilation.

8
Peer-Reviewed Publications

512
Total Citations

9
h-index

7
i10-index

Category	Count	As First/Corr. Author	Citations
Journal articles	4	3	336
Conference proceedings	3	2	154
Book chapters	1	1	22
Total	**8**	**6**	**512**

15 Selected Publications

The five publications below are identified by the candidate as most representative of the research program described in Part I.

[P1] Elena Rostova and Sarah Jenkins. "Robust Federated Learning under Non-IID Data Distributions." *Journal of Machine Learning Research*, 23(45):1023–1056, 2022.
Introduced a stability-aware aggregation scheme improving worst-client accuracy by 11 points under client heterogeneity. **146 citations**

[P2] Elena Rostova, Priya Nandakumar, and Tomasz Wróbel. "SynapseNet: Adaptive Graph Neural Networks for Dynamic Systems." *Proceedings of ICML*, pp. 890–899, 2024.
Adaptive per-node receptive fields for graph-structured data; adopted as a baseline in 14 subsequent papers. **98 citations**

[P3] Elena Rostova, David Vance, and Marcus Carter. "Neural Architecture Search for Low-Power Edge Devices." *IEEE Transactions on Computers*, 72(8):2145–2158, 2023.
Matched hand-tuned edge architectures at 38% of the multiply-accumulate cost. **87 citations**

[P4] Sarah Jenkins and Elena Rostova. "Algorithmic Fairness and Transparency in Decision Support Systems." *ACM Transactions on Interactive Intelligent Systems*, 14(2):112–135, 2024.
Showed robustness constraints alone do not guarantee equitable subgroup outcomes. **74 citations**

[P5] Elena Rostova and Sarah Jenkins. "Communication-Efficient Federated Learning for Clinical

Time-Series Data.” *Proc. Workshop on Machine Learning for Health (ML4H)*, pp. 45–53, 2021. *Reduced per-round communication cost 4.2× for bandwidth-constrained clinical networks.* ***Best Paper Award***

16 Complete Publication Record

The full list below is generated from the candidate’s maintained bibliography and includes all peer-reviewed items from the review period, in the order in which they were compiled.

References

Sarah Jenkins and Elena Rostova. Algorithmic fairness and transparency in decision support systems. *ACM Transactions on Interactive Intelligent Systems*, 14(2):112–135, 2024.

Elena Rostova and Marcus Carter. Federated and decentralized learning: Foundations and open problems. In Helena Marsh and Thomas Bright, editors, *Advances in Trustworthy Machine Learning*, pages 211–244. Meridian University Press, 2023.

Elena Rostova and Sarah Jenkins. Communication-efficient federated learning for clinical time-series data. In *Proceedings of the Workshop on Machine Learning for Health (ML4H)*, pages 45–53. Synapse Research Group, 2021. Best Paper Award.

Elena Rostova and Sarah Jenkins. Robust federated learning under non-iid data distributions. *Journal of Machine Learning Research*, 23(45):1023–1056, 2022.

Elena Rostova and Priya Nandakumar. Graph-based anomaly detection for distributed sensor networks. *ACM Transactions on Sensor Networks*, 21(3):1–27, 2025.

Elena Rostova, David Vance, and Marcus Carter. Neural architecture search for low-power edge devices. *IEEE Transactions on Computers*, 72(8):2145–2158, 2023.

Elena Rostova, Priya Nandakumar, and Tomasz Wróbel. Synapsenet: Adaptive graph neural networks for dynamic systems. In *Proceedings of the International Conference on Machine Learning (ICML)*, pages 890–899. Vertex Foundation, 2024.

Elena Rostova, Fatima Al-Sayed, and David Vance. Explainable artificial intelligence for clinical diagnostics. In *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, pages 1420–1432. Apex Research Council, 2025.

PART V

Evidence Appendix

Supporting materials retained in the dossier binder

The items summarized below are retained in full in the physical and electronic dossier binder submitted alongside this document. Each is indexed by tab letter for reviewer navigation; page references are to the binder, not to this summary document.

Tab A — Teaching Evaluations

Complete student evaluation reports for all 12 course offerings listed in Part II, including raw score distributions and free-response comments.

Tab B — External Letters

Six solicited letters of evaluation from external referees at peer institutions, assessing the significance of the research program in Part I.

Tab C — Grant Documentation

Award notices, budgets, and progress reports for all three external grants listed in Part I, Section 4.

Tab D — Selected Reprints

Full-text reprints of the five publications listed in Part IV, Section 2, as published.

Tab E — Advising Records

Committee memberships, milestone forms, and placement records for the seven graduate students listed in Part I, Section 5.

Tab F — Service Verification

Appointment letters and activity logs corroborating the departmental, university, and professional service listed in Part III.

17 Appendix Index

Tab	Format	Contents	Binder Pages
A	Printed + digital	Teaching evaluation reports (12 offerings)	pp. 1–38
B	Sealed, printed	External evaluation letters (6 referees)	pp. 39–52
C	Digital only	Grant award and progress documentation	pp. 53–71
D	Printed	Full-text reprints of selected publications	pp. 72–104
E	Printed + digital	Graduate advising and placement records	pp. 105–116
F	Digital only	Service appointment letters and logs	pp. 117–129

18 Certification and Signatures

By signing below, the candidate certifies that the contents of this dossier are accurate and complete to the best of their knowledge.

_____

Elena Rostova, Candidate Date

_____

Department Chair Date

_____

College Promotion & Tenure Committee Chair Date

_____

Dean, College of Engineering Date