Approved by the Regents
May 19, 2022

PROMOTION RECOMMENDATION
The University of Michigan – Flint
College of Arts and Sciences
Department of Mathematics and Applied Sciences

Linda Zhu, assistant professor of engineering, Department of Mathematics and Applied Sciences, College of Arts and Sciences, is recommended for promotion to associate professor of engineering, with tenure, Department of Mathematics and Applied Sciences, College of Arts and Sciences [also assistant professor of innovation and technology, College of Innovation and Technology].

Academic Degrees:

Ph.D.	2012	Wayne State University, Mechanical Engineering, Detroit, MI
M.S.	2009	Wayne State University, Mechanical Engineering, Detroit, MI
B.S	2007	Tongji University, Automobile Engineering, Shanghai, China

Professional Record:

2016-Present	Assistant Professor of Engineering, University of Michigan-Flint, Michigan
2015-2016	Associate Professor Engineering, Austin Peay State University, Clarksville, Tennessee
2012-2015	Assistant Professor of Engineering, Austin Peay State University, Clarksville, Tennessee

Summary of Evaluation:

Teaching: Professor Zhu has successfully taught eight different courses since joining the mechanical engineering faculty in 2016. Course content ranges from introductory courses (EGR 230-Statics or AUE 300-Fundamentals of Automotive Engineering) to senior design (EGR 465 and EGR 466) as well as graduate-level independent study (EGR 591). She developed a new special topics course (EGR 392) and redesigned several others to enhance student learning experiences. Courses have been delivered in a variety of modes to serve the engineering program. Professor Zhu's teaching philosophy emphasizes student practice and project-based learning. This allows students to gain transferable problem-solving skills that are essential across engineering careers. She often "flips" classrooms to provide students active learning opportunities. Professor Zhu creates an open and cooperative learning environment. Student evaluations confirm that Professor Zhu is approachable and enthusiastic. She is able to translate theory and process in order to reach students regardless of their current level. "She is an amazing and friendly professor who understands the students." She consistently updates courses with new technology and cutting-edge content. Her numerical course evaluations related to instructor excellence and setting high standards are consistently over 4.5 on a 5-point scale and are among the highest in the Engineering program. Students appreciate how accessible and clear she is. Impressively, students uniformly report that Professor Zhu made the transition to online instruction seamlessly.

Professor Zhu has a solid record of engaging students in the research process, providing them with further experience and knowledge. Professor Zhu has contributed to the development of advising policies and analyses of assessment data to ensure student success. Her research mentorship extends beyond the undergraduate major to graduate students as well as other units. She is an active and effective advisor.

Research: Professor Zhu's scholarly work focuses on the analysis of the characteristics of noise and vibration. This work has a variety of applications, including noise control. She also does work in signal processing which applies calculations to sensor signals to achieve in-depth information for a measurement. While these topics fall generally under Professor Zhu's expertise in mechanical engineering, she has recently expanded this interest to pursue projects in bioengineering, including applying her expertise to the study of tinnitus and other neurological disease diagnoses, as well as building medical devices. She has produced five peer reviewed journal publications since arriving at UM-Flint. She is the first author on each of these publications. Her scholarly record is further complemented by five peer-reviewed conference papers in leading conferences including ASME and IEEE and SAE International as well as three published abstracts. She has presented several posters and there are multiple works in progress.

The quality of Professor Zhu's scholarly activity was recognized in 2021 when she was awarded the Linda Hinsdale Stone Junior Faculty Award. She has also secured several internal grants to support her research. Some of her most recent work has involved an interdisciplinary collaboration between engineering, psychology and computer science faculty. The work is supported by an M-Cubed grant and received the Hagerman Faculty Entrepreneurship Award. She also collaborates with researchers at other institutions.

Recent and Significant Scholarly Activity:

N. Zhu and N. Miller, "Assessment System for Parkinson's Disease Tremor and Correlation Analysis With Applied Signal Processing Algorithms", *ASME Journal of Engineering and Science in Medical Diagnostics and Therapy,* vol. 3, (4), 2020.

N. Zhu, H. Luo, and J. Zhang, "Evaluating Auditory Neural Activities and Information Transfer Using Phase and Spike Train Correlation Algorithms," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 28, (7), pp. 1548-1555, 2020.

N. Zhu, "Embedding Active Learning and Design-Based Projects in a Noise and Vibration Course for the Undergraduate Mechanical Engineering Program," *International Journal of Mechanical Engineering Education*, pp. 30641902092059, 2020.

Service: Professor Zhu has made impactful service contributions at all levels. She reliably attends and participates in program, department, college and university meetings. She crafted the first draft of a departmental strategic plan (former CSEP) and has been a crucial contributor during the ABET assessment and accreditation process. She has contributed to lecturer search committees and was responsible for determining and applying graduate admissions criteria within engineering. Professor Zhu has been a leader in recruiting and retaining women in engineering. She reliably participates in recruitment events (e.g., Fall previews, STEM open house) and leads activities for the GEMS (Girls in Engineering, Math and Science) summer camp. She also serves as the faculty advisor to the Society of Women Engineers and works

consistently to recruit new students to the mechanical engineering program and to retain and ensure the success of all of her students. Professor Zhu serves on the CAS LEO Major Review Committee and the Summer Interim Committee for two summers. She also serves on the Faculty Council as a representative for the College of Innovation and Technology. Her community service includes serving as a judge at the Flint Regional Science Fair. Professionally, she serves on a variety of national review boards for journals and conferences.

External Reviewers:

Reviewer A: "The second paper of the list is considered a distinguished paper. This paper was published in Q1 journal, contained two new methods, with clear mathematical models and good results."

Reviewer B: "The quality of the candidate's works and the quantity are generally good. Based on Google Scholar citation report, Dr. Na (Linda) Zhu has recorded 12, 6, 8, 12, 6, 5 citations in the years 2016, 2017, 2018, 2019, 2020, and 2021, respectively."

Reviewer C: "In her 2020 IEEE paper, she introduces signal processing techniques, phase-phase correlation and spike train correlation, to examine coherence of signals from different parts of the brain. These are new, innovative signal analysis methods which she has proposed to meet challenges where the signals may be of differing types or amplitudes."

Reviewer D: "Her work on Parkinson's Disease patients is very impressive. My opinion is that it is comparable to the best in the field. I also see great potential in her expertise of signal processing in the near future where artificial intelligence is developed for practical use."

Reviewer E: "She has made significant contributions to the field. In particular, her seminal work in creating nondestructive devices and biosensing for monitoring diseases have laid the foundation for various applications ranging from robotics, electronics and healthcare industry."

Reviewer F: "The candidate has an H-index of 4 with 33 citations, which is good but not outstanding. However, when considering the overall continued professional growth and productivity, and that a large amount of research is not expected as in a major research institution, the candidate's scholarly productivity and impact is very good."

Reviewer G: "I consider Dr. Zhu's most recent publication with ASME sponsored by her University of Michigan M-Cubed Fund outstanding. It demonstrates Dr. Zhu's expertise in hands-on experiments and her strength in signal processing."

Reviewer H: "Her recent work on finding methods for assessing Parkinson's Disease treatments using apps and advanced vibration analysis shows the type of synergistic activity important in modern scholarly work."

Reviewer I: "…her publications appear in well-respected journals with reasonable impact factors particularly given the focus of her research and size of her audience

Reviewer J: "The journal paper (a) is considered outstanding. …the content of this paper is plausible and is a creative contribution in the research area of Parkinson Disease Intervention."

Summary of Recommendation:

Professor Zhu is a passionate and effective teacher. She provides active learning opportunities that lead to increased student success. She has a strong record of interdisciplinary research activity that applies traditional methods of engineering to new fields. Professor Zhu's student engagement extends beyond the classroom through advising and research mentoring. Her service has improved programming and increased student access to STEM. It is with the support of the College of Arts and Sciences Executive Committee that I recommend Linda Zhu for promotion to associate professor of engineering, with tenure, Department of Math and Applied Sciences, College of Arts and Sciences.

Recommended by:

Susan Gano-Phillips

Susan Gano-Phillips, Dean
College of Arts and Sciences

Recommendation endorsed by:

Sonja Feist-Price

Sonja Feist-Price, Provost and
Vice Chancellor for Academic Affairs

Deba Dutta

Debasish Dutta, Chancellor
University of Michigan – Flint

May 2022