Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Mechanical Engineering

Allen P.C. Liu, associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering, associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and associate professor of biophysics, without tenure, Program in Biophysics, College of Literature, Science, and the Arts, is recommended for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering, professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and professor of biophysics, without tenure, Program in Biophysics, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2007	University of California, Berkeley, Biophysics, Berkeley, CA
B.S.	2001	University of British Columbia, Biochemistry, Vancouver, BC, Canada

Professional Record:

2018 – present	Associate Professor (with tenure), Department of Mechanical Engineering, University of Michigan
2018 – present	Associate Professor (without tenure), Department of Biomedical Engineering, University of Michigan
2018 – present	Associate Professor (without tenure), Program in Biophysics, University of Michigan
2013 – 2018	Assistant Professor, Program in Biophysics, University of Michigan
2012 – 2018	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2012 – 2018	Assistant Professor, Department of Biomedical Engineering, University of Michigan
2007 – 2011	Post-Doctoral Fellow, Department of Cell Biology, The Scripps Research Institute, La Jolla, CA

Summary of Evaluation:

Teaching: Professor Liu has effectively taught multiple undergraduate and graduate classes. His teaching efforts have consistently garnered high appraisals, and he was nominated for a Golden Apple Award. Student accolades highlight his genuine dedication to their learning and achievements, as well as his enthusiasm and unwavering commitment to teaching. Professor Liu actively fosters an inclusive classroom environment and supports student challenges. Throughout the COVID pandemic, Professor Liu successfully adapted lab and capstone classes for ME395 and ME450. He has graduated seven Ph.D. students (as chair or co-chair) and has another six students in progress (one as co-chair). He has also been a member of several other Ph.D. committees and is active in advising master's and undergraduate students.

Research: Professor Liu's work in the mechanobiology of biological membranes, clathrin-coated pit dynamics, synthetic cells, and membrane biomechanics has garnered international acclaim. Notably, his contributions include the development of novel plasma membrane tension sensors, discoveries in

the field of cancer cell migration and actin dynamics, and the creation of mechanosensitive artificial cells. Professor Liu's prolific output along with the significant impact of his work place him in the top 5% of his peer group. With his research consistently securing substantial funding from agencies like the NIH and NSF, Professor Liu has proven his expertise and promise in the field. His past and present grants total $9.7M of which his share is $8.8M and he has $1.1M - $1.3M in pending grants. His publications, where he often serves as the senior corresponding author, reflect his collaborative spirit with graduate students and postdoctoral fellows. He has published over 85 journal articles, over 50 while in rank, in top journals.

Recent and Significant Publications:

Hsu Y-Y, Chen SJ, Bernal-Chanchavac J, Sharma B, Moghimianavval H, Stephanopoulos N, Liu AP, "Calcium-triggered DNA-mediated membrane fusion in synthetic cells," *Chemical Communications*, 2023.

Hsu Y-Y, Resto-Irizarry AM, Fu J, Liu AP, "Mechanosensitive channel-based optical membrane tension reporter," *ACS Sensors*, 8(1), 12-18, 2023.

Wubshet NH, Wu B, Veerapaneni S, Liu AP, "Differential regulation of GUV mechanics via actin network architectures," *Biophysical Journal*, 122, 1-14, 2023.

Wubshet NH, Liu AP, "Methods to mechanically perturb and characterize GUV-based minimal cell models," *Computational and Structural Biotechnology*, 21, 550-562, 2023.

Ma Y, Kapoor B, Sharma B, Liu AP, Ferguson AL, "Computational design of self-assembling peptide chassis for synthetic cells," *Molecular Systems Design & Engineering*, 8, 39-52, 2023.

Service: Professor Liu's commitment to service spans across multiple levels, including department, college, and university-wide involvement. His role as the SACUA chair has garnered significant praise. Additionally, he has contributed to various university-wide committees, supported the Asian American community, and participated in bio-sciences related committees. At the college level, he served on the ADVANCE CoE Advisory Board, ME Chair Search committee, and casebook committees. At the department level, he consistently contributed to multiple programs. Furthermore, he has actively engaged in professional communities by chairing sessions and conducting reviews for journals, conferences, and funding agencies.

External Reviewers:

Reviewer A: "Dr. Liu has established a strong, interdisciplinary research program, as demonstrated by his excellent publication record, conference presentations, and significant extramural funding from NIH and NSF."

Reviewer B: "With this impact, Dr. Liu stands out as one of the leading mid-career investigators in the areas of cell mechanics, synthetic biology, and reconstitution of cellular processes. His creative approaches and ability to make connections across disciplines is quite special."

Reviewer C: "Allen's research portfolio, consisting of actin network reconstitution, artificial cells, and cellular biomechanics and mechanotransduction is broad, interdisciplinary, and coherent. He has a longstanding interest in reconstituting actin polymerization and crosslinking in synthetic lipid vesicles, and this work has flowed naturally in two directions."

Reviewer D: "Allen's service to the biophysics and mechanobiology community has been outstanding. He has organized numerous meetings, including a square table workshop in physical biology that was among the most useful of such workshops I've ever attended."

Reviewer E: "Allen's unique collection of foundational works places him among the leaders in his peer group. I need to qualify that statement, though, as it's difficult to even find appropriate peers since no one else has quite the same mix of tools and fundamental concepts."

Summary of Recommendation: Professor Liu's impactful research on biological membranes and cell dynamics has led to significant advancements in the field. Professor Liu's dedication to both his students and the academic community, coupled with his inclusive teaching methods, reflects his commitment to fostering a supportive learning environment. It is with the support of the College of Engineering Executive Committee that we recommend Allen P.C. Liu for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering, professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and professor of biophysics, without tenure, Program in Biophysics, College of Literature, Science, and the Arts.

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