**Approved by the Regents**
**May 19, 2022**

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF CELL AND DEVELOPMENTAL BIOLOGY
COLLEGE OF ENGINEERING AND MEDICAL SCHOOL
DEPARTMENT OF BIOMEDICAL ENGINEERING
COLLEGE OF LITERATURE, SCIENCE, AND THE ARTS
DEPARTMENT OF BIOPHYSICS

Ajit P. Joglekar, Ph.D., associate professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School, associate professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and associate professor of biophysics, without tenure, Department of Biophysics, College of Literature, Science, and the Arts, is recommended for promotion to professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School, professor of biomedical engineering, Department of Biomedical Engineering, College of Engineering and Medical School, and professor of biophysics, without tenure, Department of Biophysics, College of Literature, Science, and the Arts.

Academic Degrees:

| | | |
|---|---|---|
| Ph.D. | 2004 | University of Michigan |
| M.S. | 2001 | University of Michigan |
| B.S. | 1999 | University of Pune, India |

Professional Record:

| | |
|---|---|
| 2017 - present | Associate Professor of Cell and Developmental Biology, with tenure, University of Michigan |
| 2017 - present | Associate Professor of Biophysics, without tenure, University of Michigan |
| 2017 - present | Associate Professor of Biomedical Engineering, without tenure, University of Michigan |
| 2011 - 2017 | Assistant Professor of Cell and Developmental Biology, without tenure, University of Michigan |
| 2011 - 2017 | Assistant Professor of Biophysics, without tenure, University of Michigan |
| 2011 - 2017 | Assistant Professor of Biomedical Engineering, without tenure, University of Michigan |

Summary of Evaluation:

Teaching: As an assistant professor, Dr. Joglekar developed and taught a new course to teach Quantitative Fluorescence Microscopy to graduate students. His successful efforts were recognized by receipt of an Endowment for Basic Sciences Teaching Excellence award in 2016. Beginning in 2019, he spearheaded the modernization of the Cell Biology curriculum in the department. In collaboration with faculty within Cell and Developmental Biology (CDB) and across the University (Biomedical Engineering and Biophysics), Dr. Joglekar developed and is directing a new course, Quantitative Cell Biology (CDB560). This course provides new graduate students from the Program in Biomedical Sciences (PIBS), Departments of Biophysics, Chemistry, and Biomedical Engineering, a quantitative foundation rooted in the biophysical and biochemical principles underlying much of cell biological research. Additionally, Dr. Joglekar trains the students in basic computer programming using Python as the language of choice. In 2019, Dr. Joglekar undertook another endeavor to promote out-of-the-box thinking and inclusive scientific dialog. In collaboration with Dr. Heemskerk, a junior faculty member in CDB, he has started a monthly journal club titled, *And Now For Something Completely Different*. This

club seeks to broaden the scientific horizons and discourse by discussing scientific papers that are completely outside the biomedical sciences. Through informal dialog, the club encourages trainees to be comfortable in discussing concepts beyond their comfort zone.

In addition to classroom instruction, Dr. Joglekar devotes significant amounts of time and energy teaching and mentoring undergraduate and graduate students and post-doctoral fellows. He encourages critical, independent thinking, and promotes professional development by helping students hone their skillset in scientific presentation and discussion. In 2015, his Ph.D. student, Dr. Pavithra Aravamudhan, received the prestigious Kaluza Prize for Excellence in Research awarded by the American Society for Cell Biology. Dr. Joglekar has or continues to serve on many dissertation committees across the many programs in which he actively participates and devotes a significant amount of his attention to nurturing undergraduate scientists. Most of the publications from his lab have had multiple undergraduate students as contributing authors.

Research: Dr. Joglekar has established himself as a creative scientist in the field of cell division, and develops novel, quantitative approaches to study the cell biology and biophysics of the cellular machinery that accurately segregates chromosomes during cell division, thus maintaining genomic stability. Specifically, his lab has made seminal contributions to the understanding of two complex systems involved in chromosome segregation: the kinetochore, which is a macromolecular machine that connects the microtubule-based mitotic spindle to the centromeric DNA of each chromatid, and the mitotic checkpoint, which is a signaling cascade that controls the timing and fidelity of mitotic progression. In 2016, he was a finalist for the Gibco Emerging Leader Prize from the American Society of Cell Biology. In 2020, Dr. Joglekar was awarded a patent for his invention, a method that uses a genetically encoded system of proteins to exogenously control mitotic progression in vertebrate cells. He is now using the insights he gained into these systems from the last ten years of research to make inroads into understanding the role of kinetochore and mitotic checkpoint misregulation in driving and propagating genomic instability in cancerous cells.

Even as his main research program continues to flourish, Dr. Joglekar has added an exciting new research direction, using *de novo* designed proteins to create synthetic kinetochores that can segregate chromosomes. To kickstart this research, he spent six months of his sabbatical, in 2019, training in computational protein design in the lab of Dr. David Baker in the Institute of Protein Design at the University of Washington. In 2020, he was awarded an Accelerator Award from the Endowment for Basic Science to push this research forward. Dr. Joglekar's research has been published in leading journals, including *eLife*, *Journal of Cell Biology*, and *Current Biology*, and he has maintained consistent funding for his work since 2011, including funding from the Burroughs Wellcome Fund, the NIH, and a Maximizing Investigators Research Award.

Five Recent and Significant Publications:

Roy B, Han SJ, Fontan AN, and Joglekar AP: The copy-number and varied strengths of MELT motifs in Spc105 balance the strength and responsiveness of the spindle assembly checkpoint. *ELife* 9: e55096, 2020. PM32479259/PMC7292645

Kukreja AA, Kavuri S, and Joglekar AP: Microtubule Attachment and Centromeric Tension Shape the Protein Architecture of the Human Kinetochore. *Current Biology* 30(24): 4869-4881, 2020. PM33035484 /PMC7755829

Roy B, Verma V, Sim J, Fontan AN, and Joglekar AP: Delineating the contribution of Spc105-bound PP1 to spindle checkpoint silencing and kinetochore-microtubule attachment regulation. *The Journal of Cell Biology* 218(12): 3926-3942, 2019. PM31649151/PMC6891095

Chen C, Whitney IP, Banerjee A, Sacristan C, Sekhri P, Kern DM, Fontan AN, Kops GJPL, Tyson JJ, Cheeseman IM, and Joglekar AP: Ectopic Activation of the Spindle Assembly Checkpoint Signaling Cascade Reveals Its Biochemical Design. *Current Biology* 29(1): 104-119, 2019. PM33035484/PMC7755829.

Humphrey L, Felzer-Kim I, and Joglekar AP: Stu2 acts as a microtubule destabilizer in metaphase budding yeast spindles. *Molecular Biology of the Cell* 29(3): 247-255, 2018. PM29187578

Service: Dr. Joglekar is actively involved in many different departmental activities including the Graduate Admissions, Curriculum, and Diversity, Equity and Inclusion committees. He has organized a monthly Cellular and Developmental Biology social to promote inclusivity, informal dialog, and collaboration within the department. Dr. Joglekar is a member of the American Society for Cell Biology and has served as a reviewer for many high-impact scientific journals and as an ad hoc member of national and international review panels, including the French Foundation for Medical Research, and as an invited speaker in Portugal.

External Reviewers:
Reviewer A: "…Ajit published a series of landmark papers in which he measured the copy numbers of various kinetochore components in vivo, and the nanometer-scale distances between these components. It is no exaggeration to say that this work by Ajit provides the very foundation for our current understanding of the architecture of kinetochores. He is now well known and very well respected for these studies."

Reviewer B: "Dr. Joglekar has established himself as a major contributor to progress toward increasing understanding the architecture, mechanics, and regulation of kinetochores; key cellular structures in ensuring the proper inheritance of the chromosomes that form the basis for an organism's genetic legacy. His research fills a valuable, unique position in the mitosis field because he alone combines quantitative mechanochemistry thinking with high resolution imaging and a strong intuition for mechanistically important questions."

Reviewer C: "As an independent investigator he has developed a research program focused on understanding the molecular events that ensure faithful chromosome segregation during cell division. He has pursued two related, but separate paths of inquiry…His work led to a very important insight into the mechanical changes in some of the kinetochore proteins dependent on microtubule attachment. This was linked to checkpoint activity…Overall, his research productivity in terms of peer-reviewed publications as a corresponding author is good and he has generated a solid reputation in the field through his quantitative approach to these complicated cell biological problems."

Reviewer D: "Ajit is incredibly smart, motivated, and has brought a unique biophysical/engineering mindset to the study of chromosome segregation. His contributions have been highly influential, and he is fearless in venturing into new areas, as exemplified by his recent forays into protein and pathway engineering…Ajit's work has had a tremendous impact on the chromosome segregation field…Ajit is a highly talented biophysicist/cell biologist who brings a unique engineering mindset to understanding the complex problem of chromosome segregation. I have enormous respect for his contributions, and I look forward to seeing his innovative new approaches develop in the future. His unique skill set, his ability to mentor students, and his personality make him a valuable colleague, and I recommend him unreservedly and with enthusiasm for the promotion to full Professor."

Reviewer E: "Ajit's scientific interest is in a very crowded area of cell biology - mechanisms that couple mechanics of mitotic spindle to the control of cell cycle. Obviously, it a critically important area, as uncoupling these two processes results in chromosome loss and neoplastic transformation. In spite of the fact that this area is so crowded, Ajit was able to make very significant contributions to the field. He

demonstrated how the mitotic checkpoint maximizes the accuracy of chromosome segregation in mitosis, at the same time minimizing delays in cell division. Dr. Joglikar has published a number of important papers in the past few years…In total, his work is of high quality and addresses an important biological question."

Summary of Recommendation:
Dr. Joglekar has established himself in his field based on a strong record of research excellence, high quality, and innovation that is recognized broadly by leading scientists inside and outside of his research field. He will continue to lead our progress and standing in the field of mitosis for years to come. We are pleased to recommend Ajit P. Joglekar, Ph.D. for promotion to professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School, professor of biomedical engineering, without tenure, Department of Biomedical Engineering, College of Engineering and Medical School, and professor of biophysics, without tenure, Department of Biophysics, College of Literature, Science, and the Arts.

Marschall S. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean, Medical School

Alec D. Gallimore, Ph.D.
Robert J. Vlasic Dean of Engineering
College of Engineering

Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

May 2022