

Theoretical + Applied Mechanics

CORNELL ENGINEERING

Degree Programs and Research Areas

TAM offers an MEng in Engineering Mechanics, while the Graduate Field offers M.S. & Ph.D. degrees in the concentrations of (1) Solid Mechanics, (2) Dynamics and Space Mechanics, (3) Fluid Mechanics, and (4) Mechanics of Materials. We teach engineering mechanics at the sophomore level and lead the instruction of the first two years of engineering mathematics. We offer foundational courses in engineering mathematics, dynamics and solid mechanics for graduate students from across the College.

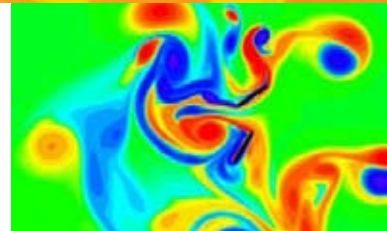
TAM research focuses on the development and analysis of mechanical and mathematical models. More specifically our three main areas are nonlinear dynamical systems, continuum mechanics and biomathematics. Our research areas are broad, currently including, for example, synchronization, adhesion, fracture, granular mechanics, nonlinear vibrations, mechanics of biomolecular structures, ballistic performance of fibrous systems, animal locomotion and cardiac dynamics. Most of the research is basic and fundamental and thus often applicable in disparate fields. Multi-disciplinary work is a long-standing hallmark of the department.

Trends

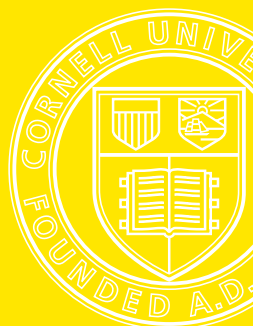
Research productivity as measured by papers, citations and PhDs granted remains high despite a recent decline in sponsored research funding. The number of TAM PhD applications dropped in 2004–05, but has since remained steady. The use of computation has evolved to the point where simulation pervades most of our research and teaching. Bio-related research projects have increased greatly.

Significant Achievements

Steve Strogatz was awarded the Joint Policy Board for Mathematics Communications Award for his DVD course on Chaos. Andy Ruina broke the world endurance record for walking robots. Three articles, by Strogatz, Ruina and Burns, appeared in Nature in the 2005–06 academic year. Both Strogatz and Herbert Hui received Tau Beta Pi teaching awards. Richard Rand was named Weiss Teaching Fellow. Leigh Phoenix received NASA Engineering Safety Center Engineering Excellence Award. The IGERT Program in Nonlinear Science was renewed under the leadership of John Guckenheimer who was also named Fellow of the American Academy of Arts and Sciences. Joe Burns curated a show of on Saturn images at the Johnson Museum and the American Museum of Natural History.



Computed vorticity field created by fore and hind wings of a hovering dragonfly. (Wang)



Goals, Challenges and Opportunities

New faculty members will carry TAM forward. Thus making excellent hires is our most important coming task. Our tradition of applied science and engineering in a multi-disciplinary context renders TAM a great place for the growth of exciting new areas and the recruitment of brilliant, creative individuals. By not being confined to any one particular engineering discipline, TAM enjoys unusual latitude in the directions of research. We can take advantage of this latitude to increase both our research funding and the number of Ph.D. students. TAM should be even more renowned within the college for providing excellent, responsive instruction to undergraduates and to graduate students from other Fields. We hope to develop a viable, nationally unique MEng program that will help the department financially.

Many TAM faculty are now near retirement. We will continue to press for opportunities to hire new talent so we can continuously identify and engage outstanding potential faculty candidates. TAM has no endowment and our only alumni are our Ph.D. students. An effort to maintain better contact with our alumni is in the works. Renewed interest in nuclear power and the rapid increase in the deployment of composite materials for aircraft and wind turbines are likely to breathe new life into research in mechanics of materials and structures.



London's Millennium bridge wobbled so much on its opening day that it was shut down. Steve Strogatz



In TAM we value and enjoy teaching, we allow nature to inspire our mechanical inventions, and we use mechanics to understand how nature makes things move.