

Professor Sidney Yip, Ph.D.

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By Justin Tan

From a purely scientific standpoint, Professor Yip teaches in the Nuclear Science and Engineering Department. His recent teaching duties concern both graduate and undergraduate nuclear physics, graduate subjects in neutron physics and in nuclear and atomic collision phenomena, and an advanced subject pertaining to statistical processes and atomistic simulations. Prof. Yip also involves himself with a number of extracurricular activities. For example, in spring 2002, along with 9 other faculty members in 6 departments, Professor Yip introduced an Institute-wide undergraduate subject on introduction to modeling and simulation. His current departmental duties include serving as the Financial Aid Officer, Undergraduate Registration Officer, and the Coordinator of the Nuclear Science and Technology Program.

Sidney Yip was born in Beijing, China where he was raised until 1950 when he, his parents, and his two brothers immigrated to the United States. Initially, he attended school in San Francisco but soon moved to New Jersey where he graduated in 1953. Professor Yip then sought college degrees at the University of Michigan, garnering a Bachelors of Science in Mechanical Engineering (1958), a Masters of Science in Nuclear Engineering (1959), and finally a Ph. D. in Nuclear Engineering (1962). His formal education ended with a postdoctoral year at the University of Michigan. Before joining the Nuclear Engineering Faculty at MIT, he worked for two years as a Research Associate in the Department of Applied Physics at Cornell University. Since coming to MIT, he has garnered several milestones including a professorship in 1973 and a secondary appointment in 2000 to the Department of Materials Science and Engineering.

However, apart from his scientific interests, Prof. Yip reflects a sincere enthusiasm towards teaching and passing on his own experiences, stressing several valuable lessons on the nature of education and learning. Most importantly, he stresses that whether a toddler, adolescent, or adult, the learning process never truly ends. Therefore, it is important to do something enjoyable, for the knowledge and education imparted will exist as a companion throughout one's entire life. Professor Yip offers much more to MIT than mere scientific information, as apparent every fall, where he co-leads a Freshman Advisor Seminar on career options in biomedical research. Through the seminar, he conveys the importance of learning, and more specifically, happiness in learning, to disoriented MIT freshman lost in a sea of possibilities.

Professor Sidney Yip's philosophy on choosing a career path has been fundamentally influenced by MIT. Those who reflect MIT's outlook will achieve at MIT, and more importantly, in life in general. The institution's mission, according to him, outlines the fundamental concepts that should be considered by every human being in deciding on which area of knowledge to pursue. Thus, Prof. Yip continually reiterates the ideals with which MIT is based on: "To develop the ability and passion to work wisely, creatively

and effectively for the benefit of humankind [...] To generate, disseminate and preserve knowledge, working with others to bring this knowledge on the world's great challenges [...] To combine rigorous study with the excitement of discovery." Above all, he stresses four fundamental aspects inherent within the school's environment: passion, great challenges, rigorous study, and discovery. The right path is one which generates a passion for facing great challenges and one which excites a person to study rigorously in order to achieve some level of personal or public discovery. With this in mind, it is important that each student know what he or she wants to do, not necessarily indefinitely, but from one moment to the other.

Even though most students do not know what they want to do, Prof. Yip emphasizes that it is necessary to make a decision based on the current situation. This philosophy further reflects that of MIT's in choosing which area of research to develop. For the past couple of years, due to an increasing demand for knowing how the brain functions, MIT focused on developing its neuroscience facilities, thereby enhancing its [Harvard-MIT Division of Health Sciences & Technology](#) (HST) program. Most recently, it successfully inaugurated its Picower Center for Learning and Memory, the largest neuroscience research facility in the world. Nowadays, MIT has shifted its focus towards renewable energy due to the government's increasing concern to find alternative energy resources. Thus, along the same lines as MIT's philosophy to move in directions reflected by the present-day problems of society, Prof. Yip incites the same philosophy towards freshman in choosing a specific major. Furthermore, the most important aspect reflected in MIT's philosophy, in Prof. Yip's opinion, insists that the institution must keep moving forward in order to avoid being trapped in the past. In the end, "it's not what we know, it's what we don't know" that is important. Thus, MIT teaches students how to think rather than what to think so that they gain four fundamental qualities throughout their education - excellence, perseverance, boldness, and optimism. With these skills, graduates will be able to stay at the frontier of information and technology. As mentioned in the 1999 Campaign for MIT, "In our lifetime, technology and science will change and converge in abundant and bewildering ways. We may find ourselves in a place where we won't know what to do, and we'll have to figure it out. But if you've been to MIT, you've been there before."

To incoming freshman, Professor Yip's final advice is to investigate a wide variety of options. A common misconception is that MIT is a school of engineering. Although the Massachusetts Institute of Technology was founded for engineering and is historically known for that program, it has since expanded to become a world leader in numerous other faculties as well. For example, Sloan Business School now rivals both Wharton and the London School of Economics as one of the top managerial schools in the world. In the same way, the Economics department repeatedly appears at the forefront of research and innovation, known to many economists as the top program in the country. Likewise, as Professor Yip asserted and demonstrated through guest lecturers during the freshman seminar, MIT has collaborated with Harvard in the biological sciences over the past few decades to develop one of the most sought after MD, PHD, and MD-PHD programs through their HST collaboration. Thus, Professor Yip conveys that students at the institution can pursue extremely valuable educations in many different fields, including

but not exclusively in engineering. The possibilities are endless for those who choose to come to this institution. Especially for freshman, these choices can be as difficult as the information taught during the classes. Fortunately, we have such experienced professors as Sidney Yip to guide us on the journey towards our future at the Massachusetts Institute of Technology.

Current Research

Professor Sidney Yip is a significant figure in the Nuclear Engineering and Materials Science and Engineering Divisions at the Massachusetts Institute of Technology. As principal investigator, he directs the Atomistic Simulation of Materials Group at the Massachusetts Institute of Technology. His long and illustrious career has been marked with creativity and dedication towards life and learning, leading to a focus on the theory and simulation of fundamental materials properties and behavior across different length and time scales. More specifically, Professor Yip's research group concerns itself with mechanical and thermal behavior of structural and functional materials.

His research group in the Department of Nuclear Engineering, Atomistic Simulation of Materials (ASM), is dedicated to the study of materials modeling, in order to make use of theory and simulation in conjunction with experiments for validation. The group's main research topics include High-Temperature Oxidation of Refractory Borides, Molecular Conductivity, Molecular Actuation, Equation Free Modeling, Hydrolytic Weakening, and Stress-Induced Defect Nucleation.

Resources

If you would like to read more about Boron Atomistic Simulation of Materials Group, feel free to visit:

<http://mmm.mit.edu/>

Here is the MIT News article that was published in 2005 about Professor Yip's advancements in Robotic muscle:

<http://web.mit.edu/newsoffice/2005/muscle.html>