Teaching Statement - Thilina H. Weerakkody, Ph.D.

Postdoctoral Scholar, California NanoSystems Institute, UCLA

My teaching philosophy is grounded in the belief that engineering education should balance analytical rigor with hands-on exploration and creative problem-solving. I view teaching as a collaborative and evolving process as well as an opportunity to cultivate curiosity, confidence, and independence in students while connecting theory to real-world practice. My approach is built around three key pillars: 1) experiential learning through visualization and simulation, 2) project-based integration of theory and practice, and 3) mentorship that nurtures technical, professional, and societal awareness.

Making Complex Concepts Intuitive through Visualization and Simulation
Students grasp challenging concepts best when abstract ideas are made visual and interactive. I integrate computational and graphical tools, ranging from mathematical visualizations to 3D animations and CAD-based modeling, to transform equations and theories into tangible learning experiences. For instance, system dynamics and feedback behavior can be explored through simulations where students manipulate parameters and observe real-time responses. This strengthens intuition, promotes experimentation, and bridges the gap between mathematical formulation and physical interpretation.

While examination-based assessment is necessary, I believe that **hands-on experience is equally essential** for preparing students to thrive in modern engineering environments. I use visualization platforms, computational notebooks, and interactive animation tools to make complex topics more accessible. My background in CAD, SolidWorks, and Blender enables me to design interactive 3D models and animations that clarify system behavior and physical interactions.

I also encourage students to maintain "computational notebooks" to document models, results, and reflections. This practice builds reproducibility, organization, and confidence—skills critical to both academic and industrial success.

Integrating Analytical, Computational, and Industrial Perspectives
In today's data-driven world, mechanical engineers must master not only analytical problem-solving but also computational and software-based reasoning. I emphasize programming literacy, version control (e.g., Git), and scientific computing using MATLAB, Python, and numerical modeling tools. My early foundation in computer science, gained through the *British Computer Society (BCS) Diploma in IT*, provided formal training in programming, software design, and networked systems, an experience that continues to shape how I teach computational modeling and modern engineering methods.

I believe that connecting students to real-world engineering problems through industry collaborations and internships helps them appreciate the relevance of their education. By engaging with contemporary industrial challenges, students develop analytical reasoning, teamwork, and communication skills, while learning to apply theory to meaningful applications. I also encourage them to remain adaptive and curious, exploring emerging techniques and tools, coding libraries, and optimization frameworks. I have found that students often bring fresh insights or updated technologies to discussions, and I value these interactions as part of the modern learning process. In this era of accessible knowledge, an educator's role is to **guide students toward thoughtful, critical, and ethical application of information**.

Project-Based Learning and Applied Design Thinking

Engineering must be experienced through creation. I use project based learning to help students move from conceptual models to functioning systems through an end to end system development and validation process, which begins with an idea, progresses through model development and simulation, continues to prototype fabrication, and culminates in performance verification. Having completed a *Certificate in College Teaching*, I apply evidence based instructional strategies that encourage active learning, iterative problem solving, and constructive feedback. At the Sri Lanka Institute of Information Technology (SLIIT), I implemented this method in a Mechatronics course where students designed functional line following mobile robots using sensors, actuators, and embedded computation. This experience taught them the full innovation cycle including modeling, testing, and communicating results.

At the University of Iowa, I extended this philosophy to graduate education by designing MATLAB/Simulink tutorials for the *Novel Artificial Muscles and Sensors* course. These sessions helped students connect analytical models to measured system performance; a process I now aim to expand with digital-twin demonstrations and cloud-based collaborative simulations.

Mentorship, Inclusivity, and Lifelong Growth

I view mentorship as an integral extension of teaching. Over my Ph.D. and postdoctoral career, I have mentored undergraduate and master's students as well as visiting scholars, guiding them in data acquisition, modeling, and system design. My mentorship style is interactive and inclusive. I value open communication and encourage students to challenge ideas constructively. This collaborative environment ensures that students not only learn from me but also contribute perspectives that refine my own understanding.

Future Teaching Goals

At ***(name)*** University, I would be excited to teach courses such as *Scientific Computing, Numerical Methods for Engineers, and Dynamic Systems and Modeling*, while developing new electives in *Modeling and Simulation of Multi-Physics Systems, Optimization and Data-Driven Engineering, and Visualization in Engineering Education.* I am equally enthusiastic about teaching core foundational courses in mechanics and system modeling, as well as advanced electives that integrate computation and experimentation. My goal is to design courses that blend analytical modeling with computational simulation and real-world case studies, supported by strong industrial connections.

In summary, I view teaching as a bridge between analytical reasoning, creativity, and collaboration. Through visualization, scientific computing, and experiential learning, I strive to equip students with the skills to model, simulate, and optimize complex multi-physics systems that will define the next generation of engineering innovation. Examples of my teaching materials, including tutorials, lecture notes, and examinations, are available in my GitHub portfolio at thilinahwe.github.io/#/teaching