Achieving Discovery-Enriched Curriculum by integrating multidisciplinary projects with learning

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Abstract:

This project will explore a method to achieve Discovery-Enriched Curriculum by integrating multidisciplinary projects with learning, using an existing course entitled "Simulation and Modeling in Materials Science" (AP4172) with a broadened scope and certain revision on its teaching and learning activities as an sample course for demonstration and validation of the proposed method.

This project will use the advanced computational tools and promote computer-aided design and simulation in multidisciplinary areas including materials science, physics, chemistry, energy, environment, life science, and finance, based on the popular Molecular Dynamics simulations, Monte Carlo techniques and optimization approaches. We aim at facilitating students from the above areas to learn the related basic concepts, theories and tools in this course and do discovery oriented multidisciplinary projects such as new materials design, new physics exploration, energy conversion, pollutant degradation, DNA repair, drug design, and financial market prediction. The sample course will be retitled as "Simulation and Modeling in Multi-disciplinary Sciences" and will be conducted with Outcomes Based Teaching for 7 weeks, followed by supervised projects for 6 weeks for each student on a topic from his/her discipline. The supervised project will utilize the computational techniques and methods learned and resolve one real problem in a specific discipline.