

UC Merced Center for Computational Biology

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We are establishing a Center for Computational Biology (CCB) at the newest campus of the University of California. The CCB will sponsor multidisciplinary scientific projects in which biological understanding is guided by computational modeling. The center will also facilitate the development and dissemination of undergraduate and graduate course materials based on the latest research in computational biology. The Center is starting a number of activities that aim to recast biology as an information science:

- 1) Host multidisciplinary research projects in computational and mathematical biology that will provide a rich environment for graduate and undergraduate research.
- 2) Develop new mathematical and computational methods that are widely applicable to predictive modeling in the life sciences.
- 3) Develop and disseminate computational biology course materials that translate new research results into educational resources.
- 4) Extend the successes in achieving these objectives to other universities and “university-feeder” institutions such as community colleges.

This project is a multi-institutional collaboration including the new University of California campus at Merced, Rice University, Rensselaer Polytechnic Institute, and Lawrence Livermore National Laboratory, as well as individual collaborators at other sites. The CCB will foster a number of research projects that emphasize the role of predictive simulations in guiding biological understanding by funding graduate students and post-doctoral fellows with backgrounds in the mathematical and computational sciences to work on collaborative biology projects. Additionally, the center will work to translate this research into educational materials. UC Merced, as the first U.S. research university of the 21st century, offers many advantages for this new center, including an ideal venue for developing and implementing new courses and degree programs, a highly multidisciplinary faculty and organizational structure, and a strong commitment to educational outreach to diverse and underrepresented groups. New computational biology courses will be used and assessed in the new UC Merced Biological Sciences major that will be accepting freshman and junior transfers in Fall 2005. Graduate courses will be implemented in the Quantitative Systems Biology Graduate Group that began accepting graduate students in Fall 2004. All course materials will be released under an open public license using the Connexions courseware system developed at Rice University. We anticipate that this new biology curriculum will be effective in attracting students to biology who have an interest and aptitude in mathematics and computational sciences, as well as broaden the horizons of students expecting a traditional biology program. The electronic, modular course materials produced by the center will facilitate linkages to feeder schools at the state university, community college, and high school levels.

The long-term impact of the CCB will be to help train a new generation of biologists who bridge the gap between the computational and life sciences and to implement a new biology curriculum that can both influence and be adopted by other universities. Such scientists will be critical to the success of new approaches to biology, exemplified by the DOE Genomes to Life program in which comprehensive datasets will be assembled with the goal of enabling predictive modeling of the behavior of microbes and microbial communities, as well as the biological components of life, such as multiprotein machines.