

Research



Research is an integral part of the education of all students at Harvey Mudd College. The ability to conduct original investigations, to plan an approach to a problem, and to see it through are essential to success in any scholarly endeavor. We set time aside during the spring semester to celebrate the work of Harvey Mudd College students as they present their original projects in design or research. Whether this work is done as an individual research project with a faculty adviser, or as part of a class project, the emphasis is on the students' own achievements.

At HMC, research doesn't mean "spending a semester washing test tubes and staring at the back of a graduate student's lab coat." We mean professional-grade, publishable, original work, done in collaboration with full-time, big-deal professors. And undergraduate students do it—as early as their first year, perhaps, or during our expansive summer research programs, or as a major contributor to a professor's ongoing project, or for their senior research thesis. It's not hard to see the practical benefits: they develop crucial skills, gain applied experience, and push the boundary of knowledge a little further forward. But there's more. We believe that science is a lived experience, a human practice—not simply a collection of facts and formulas and truths. You have to do it to understand it, to envision its future, to ask the next impossible, essential question.

However, a myriad of complex and cutting-edge scientific instrumentation is needed to keep HMC students in the forefront of these research endeavors. This list is long, expensive and changes from year to year.

Current departmental research equipment needs for **Biology, Chemistry, Computer Science, Engineering, Mathematics** and **Physics** are included within the departmental descriptions in this portfolio.

The following is a small sample of the type of research projects completed in the recent past at Harvey Mudd College:

- Studying functional conservation of the IAB8 enhancer in the *Drosophila bithorax* complex.
- Investigating pairwise insulator interactions in the *bithorax* complex of *Drosophila*.
- Identification of double and triple mutants of *sac9-1* and phospholipase D.
- Characterization of Conserved Regulatory Elements in the Telomerase Promoter in Primates.
- Evolution of Fab-7 insulator across different *Drosophila* species.
- Evolution of IAB5 enhancer sequence and functionality in *Drosophila*.
- Fluorescence In Situ Hybridization (FISH).
- Statistical Estimation of Maxima: Racing *Sceloporus Occidentalis*.
- Investigating the use of Brainfingers for children with cerebral palsy for spatial-motor education.
- RNAi in *Tetrahymena Thermophila* Determination of Gene Functionality.
- Bias Correction in the Correlation of Sample Quantiles. Dynein 2 Light Intermediate Chain Phenotype. Testing for trade-offs in temperature tolerance: individual variation in cold vs. heat tolerance in a lizard.
- Effect of Keratocyte-Endothelial Co-culture on Fibroblast Expression of α -SMA, TKT, and ALDH. Crosslinking Histones and DNA to Prevent Transient Site Exposure.
- Rate of Excision for Human 8-oxoguanine DNA Glycosylase.
- Examining the superstructure of collagen fibers.
- Inducing Metallomesogenic Phases in Water-n-Octyl- β -D-glucopyranoside Mixtures.
- Inhibition of the Shiga toxin: Synthesizing a Gb3 Receptor Analogue.
- Using the Equal Gibbs method to generate re-entrant phase diagrams.
- Synthesis of a Third Generation Tethered Ligand. Synthesizing Ruthenium Porphyrin Dimers.
- Synthesis of Osmium Porphyrin Dimers for Experimental Studies of Metal Coupling.
- Electrostatic Interactions of Azo Dyes and Micelles.
- Determination of the Binary Lyotropic Liquid Crystal Phases Formed by n-Decyl- β -D-Glucoside in Water. Determination of Phase Diagrams of Biologically Relevant Liquid Crystals.
- Comparison of Theoretical and Experimental Studies of the Claisen Rearrangement.