Harvey Mudd College
Spring 2012 New and Revised Courses

BIOLOGY

BIOL186 HM 01 Topics in Biology: Genes and Behavior
Glater MW 11:00 am - 12:15pm BK B124

Current research on how genes influence behavior in vertebrates and invertebrates. Behaviors examined likely include olfaction, aggression, anxiety, sleep, courtship and mating. Focus on understanding the molecular mechanisms underlying these behaviors using genetic approaches, including quantitative genetics, forward and reverse genetic screens, as well as techniques for manipulating gene expression *in vivo*. Seminar format with readings from the primary literature. Counts as a seminar course for Biology majors. Prerequisites: Biology 52 and Biology 113. 3 credit hours. (Spring)

CHEMISTRY

CHE040 HM 01 Introduction to chemical research
staff M 1:15-5:15 pm arr
CHE040 HM 02 Introduction to chemical research
staff R 1:15-5:15 pm arr

Three separate four-week rotations through laboratories highlighting different sub-disciplines of chemistry. Restricted to first- or second-year students. Prerequisites: Chem 23S and Chem 23E

CHE168D HM 01 Advanced Physical Chemistry: Electronic Structure Theory
Cave MWF 11:00-11:50 am (first half sem) JA B134

An examination of modern methods for approximating the solution to the electronic Schroedinger Equation and its application to chemical systems.

JOINT CHEMISTRY AND BIOLOGY

COMPUTER SCIENCE

JOINT COMPUTER SCIENCE AND MATHEMATICS

ENGINEERING

ENG 190M HM 01 Introduction to Microelectromechanical Systems (MEMS)
Candler MW 1:15-2:30 pm PA 1285

Introduction to miniaturized sensors and actuators, with emphasis on microsystems for biomedical applications. Topics include design, materials, fabrication, and applications of MEMS. Course includes hands-on laboratory where students will design, fabricate, and test microfluidic devices. Prerequisites: E59, E83, and E84.

ENG 190R HM 01 Reliability, Maintenance and Test Engineering
Little TR 1:15-2:30 pm PA 1285

Principles of reliability, maintainability and test engineering. Course will cover methods of measuring and modeling the reliability and effectiveness of engineered systems using failure and test data. Topics will include understanding modes of failure, basic reliability models, preventive maintenance models, component vs systems reliability, life testing methods and models, and reliability centered design. Prerequisite: Math 35; juniors and seniors only.

HUMANITIES, SOCIAL SCIENCES and the ARTS

MATHEMATICS

MATH189C HM 01 Advanced Topics in Operations Research
Martonosi TR 2:45-4:00 pm BK B134

This course is a graduate-level treatment of linear programming that will include these topics: geometry of linear programming (polyhedral and convex sets), the theory of the simplex method, linear programming duality, large scale optimization algorithms, computational complexity, and ellipsoid and interior point methods.
Prerequisites: (Math 63 or 65) and (Math 55, 70, 131, or 171)

MATH189D HM 01 Algebraic Topology
Su TR 1:15-2:45 pm SPR 3A

This course is an introduction to algebraic and combinatorial topology, with an emphasis on simplicial and singular homology theory. A major theme in the course will be the connection between combinatorial and topological concepts. Topics will include simplicial complexes, simplicial and singular homology groups, exact sequences, chain maps, diagram chasing, Mayer-Vietoris sequences, Eilenberg-Steenrod axioms,

Jordan curve theorem, and additional topics as time permits. This is standard first-year graduate material in pure mathematics.
Prerequisites: Math 180

MATH189E HM 01 Topics in Partial Differential Equations
Shearer TR 4:15-5:30 pm BK B134

The focus of this course will be nonlinear partial differential equations and applications. We will discuss first order equations and hyperbolic systems of equations, covering such topics as propagation of shock waves, water waves and avalanches. Fluid flow in porous media (such as an oil reservoir) can be modeled with the porous medium equation, a nonlinear equation with special properties. Nonlinear parabolic equations are used to model population dynamics in a variety of contexts, including spreading of disease. Solution techniques include the search for special solutions such as traveling waves and other self-similar solutions.
Prerequisites: (Math 63 or 65) and (Math 55, 70, 131, or 171)

MATHEMATICAL BIOLOGY

MATHEMATICAL AND COMPUTATIONAL BIOLOGY

PHYSICS