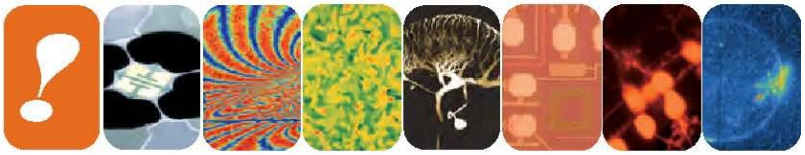

Core Curriculum Requirements

1. Freshman Mathematics (Ma 1 abc): 27 units
Ma 1 abc. Calculus of One and Several Variables and Linear Algebra. Review of calculus. Complex numbers, Taylor polynomials, infinite series. Comprehensive presentation of linear algebra. Derivatives of vector functions, multiple integrals, line and path integrals, theorems of Green and Stokes. Ma 1 b, c is divided into two tracks: analytic and practical.

2. Sophomore Mathematics (Ma 2 ab): 18 units
Ma 2 ab. Differential Equations, Probability and Statistics. Ordinary differential equations, probability, statistics.

3. Freshman Physics (Ph 1 abc): 27 units
Ph 1 abc. Classical Mechanics and Electromagnetism. The first year of a two-year course in introductory classical and modern physics. Topics: Newtonian mechanics in Ph 1 a; electricity and magnetism, and special relativity, in Ph 1 b, c. Emphasis on physical insight and problem solving. Ph 1 b, c is divided into two tracks: the Practical Track emphasizing practical electricity, and the Analytic Track, which teaches and uses methods of multivariable calculus.

4. Sophomore Physics (Ph 2 ab or Ph 12 abc1): 18 units
Ph 2 ab. Waves, Quantum Mechanics, and Statistical Physics. The second year of a five-term introductory course in classical and modern physics. Topics to be covered include waves and introductory quantum mechanics first term, statistical physics second term.

OR

Ph 12 abc. Waves, Quantum Physics, and Statistical Mechanics. A one-year course primarily for students intending further work in the physics option. Topics include classical waves; wave mechanics, interpretation of the quantum wave-function, one-dimensional bound states, scattering, and tunneling; thermodynamics, introductory kinetic theory, and quantum statistics.

5. Freshman Chemistry (Ch 1 ab): 15 units
Ch 1 ab. General Chemistry. Lectures and recitations dealing with the principles of chemistry. First term: electronic structure of atoms, periodic properties, ionic substances, covalent bonding, Lewis representations of molecules and ions, shapes of molecules, Lewis acids and bases, Bronsted acids and bases, hybridization and resonance, bonding in solids. Second term: chemical equilibria, oxidation and reduction, thermodynamics, kinetics, introduction to organic chemistry and the chemistry of life.

6. Freshman Biology (Bi 1): 9 units
Bi 1. The Biolog and Biophysics of Viruses. This course introduces non-biologists to recent advance***y***s in our understanding of how HIV and other viruses infect and cause damage to their hosts. Because understanding and treating HIV infection involves a basic knowledge of cell and molecular biology, virology, and immunology, the course will cover fundamental concepts in these areas from a quantitative, molecular, chemical, and biophysical perspective.

7. Menu Class (currently Ay 1, Ch/APh 2, ESE 1, Ge 1, IST 1, or IST 4): 9 units
Ay 1. The Evolving Universe. Introduction to modern astronomy that will illustrate the accomplishments, techniques, and scientific methodology of contemporary astronomy. The course will be organized around a set of basic questions, showing how our answers have changed in response to fresh observational discoveries. Topics to be discussed will include telescopes, stars, planets, the search for life elsewhere in the universe, supernovae, pulsars, black holes, galaxies and their active nuclei, and the Big Bang. There will be a series of laboratory exercises intended to highlight the path from data acquisition to scientific interpretation. Students will also be required to produce a term paper on an astronomical topic of their choice and make a short oral presentation. In addition, a field trip to Palomar Observatory will be organized.

Ch/APh 2. Introduction to Energy Sciences. Energy production and transduction in biological, chemical, and nuclear reactions. Bioenergetics: energy sources and storage; components of biological energy flows: pumps, motors, and solar cells; circuitry of biological energy flows and biological energy transduction pathways. Chemistry of energy production and utilization: fossil fuel utilization and energy conversion pathways; artificial photosynthesis, solar cells, and solar energy conversion. Principles of nuclear energy production: nuclear energy decay processes, fission and fusion reactions, and reactor principles.

ESE 1. Introduction to Environmental Science and Engineering.
An introduction to the array of major scientific and engineering issues related to environmental quality on a local, regional, and global scale. Fundamental aspects of major environmental problems will be addressed with an overall focus on the dynamic interplay among the atmosphere, biosphere, geosphere, and hydrosphere. Underlying scientific principles based on biology, chemistry, and physics will be presented. Engineering solutions to major environmental problems will be explored.

***Ge 1. Earth and Environment*.** An introduction to the ideas and approaches of earth and environmental sciences, including both the special challenges and viewpoints of these kinds of science as well as the ways in which basic physics, chemistry, and biology relate to them. In addition to a wide-ranging lecture oriented component, there will be a required field trip component (two weekend days). The lectures and topics cover such issues as solid earth structure and evolution, plate tectonics, oceans and atmospheres, climate change, and the relationship between geological and biological evolution.

IST 1. Introduction to Information. This course offers an introduction to the modern study of information, addressing fundamental questions about information representation, transmission, and learning. Questions considered include: What is information, and how should we represent it for storage and transmission? What does it mean to represent information efficiently? Is there a "shortest possible" description? Can we hope to communicate reliably in a noisy world? How much information can be transmitted, and what are the strategies by which we can improve reliability? What does it mean for a machine to learn? How much data must be observed to achieve reliable learning?

IST 4. Information and Logic. The course explains the key concepts at the foundations of computing with physical substrates, including representations of numbers, Boolean algebra as an axiomatic system, Boolean functions and their representations, composition of functions and relations, implementing functions with circuits, circuit complexity, representation of computational processes with state diagrams, state diagrams as a composition of Boolean functions and memory, and the implementation of computational processes with finite state machines. The basic concepts covered in the course are connected to advanced topics like programming, computability, logic, complexity theory, information theory, and biochemical systems.

8. Freshman Chemistry Laboratory (Ch 3 a): 6 units
Ch 3 a. Fundamental Techniques of Experimental Chemistry.
Introduces the basic principles and techniques of synthesis and analysis and develops the laboratory skills and precision that are fundamental to experimental chemistry.

9. Additional Introductory Laboratory: 6 units

10. Scientific Writing: 3 units
En 84. Writing Science. Instruction and practice in writing about science and technology for general audiences. The course considers how to convey complex technical information in clear, engaging prose that non-specialists can understand and appreciate. Readings in different genres (e.g., magazine and newspaper journalism, reflective essays, case studies, popularizations) raise issues for discussion and serve as models for preliminary writing assignments and for a more substantial final project on a topic of each student's choice.

11. Humanities and Social Sciences Requirements
All students must complete satisfactorily 108 units in the Division of the Humanities and Social Sciences. Of these, 36 must be in the humanities (art, English, film, history, history and philosophy of science, humanities, music, philosophy, and, with certain restrictions, languages) and 36 in the social sciences (anthropology, business economics and management, economics, law, political science, psychology, social science), in each case divided equally between introductory and advanced courses. The remaining 36 may be drawn from humanities and social sciences, including HSS tutorial courses.

14. Physical Education: 9 units
Before graduation each undergraduate is required to successfully complete 9 units of physical education. This requirement may be satisfied entirely or in part by participation in intercollegiate athletics, or successful completion of physical-education class coursework.