SCIENCE

At the earliest levels, science classes are concerned with observation and reasoning. Students engage in a variety of projects, some lasting a few minutes and others lasting the full year. Students are expected to learn how to make coherent conjectures based on their experiences and their observations. They learn how to use experiment to test, support, and refute conjecture. Everything should be hands-on, with a strong emphasis on organization and clarity.

This spirit continues through upper level classes. At each stage, students are asked to analyze conjecture and evidence. At times this is done via historical account. Students learn how people in the past resolved certain issues and are asked how they might design experiments to bolster or reject past explanations. Again, and always, experiments and organization dominate and, in so far as possible, every bit of information is produced by hands on activity.

As the classes continue, it becomes increasingly difficult to maintain this principle. The body of available knowledge is so great that one can not reasonably expect to replicate all of it. This is inevitable, though it is hoped that by this stage students will have learned enough about the nature of scientific reasoning to have formed an appreciation of this body of knowledge — a respect for it, of course, but also a healthy degree of skepticism.

Students must make and defend clear statements. All arguments are possible, but only defensible arguments may stand. Conjecture is the name of the game, but only testable conjectures are to be considered. That is, a viable conjecture must come with a set of tests which that conjecture might conceivably fail. Students are guided through that process from inception, from the mystery that comes with raw observation, to the careful analysis of experimental result. Clarity of exposition is critical throughout. Students are taught to present their experiment (its design and its results) lucidly and precisely. Where relevant, students read about science from historical and philosophical viewpoints. As with all disciplines, we teach science as an evolving set of beliefs and techniques and we emphasize not only the great successes of the field, but also its historical failures, its bounds and its limits.

It is our belief that students learn science best through constant hands-on observation and experimentation. Wherever possible, all facts are demonstrated from scratch in the laboratory. As this becomes impractical, in upper level courses students are nonetheless encouraged to challenge the facts they receive. Even in cases where the student cannot hope to carry out the relevant experiment, it is a useful exercise to perform thought experiments and to try to imagine what experiments one might perform were practical or ethical considerations removed.

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HIGH SCHOOL COURSE OFFERINGS 2010 – 2011

Advanced Biology

This detailed study of molecular and cellular biology will focus on the basic processes and structures of living organisms as well as the consequences these structures have for macroscopic phenomena. This course will cover the syllabus attached to the Advanced Placement examination. Intensive laboratory work will complement the theoretical material.

Chemistry II

This second-year course focuses on the historical development of chemistry. Readings will be drawn from a variety of primary and secondary sources that shed light on how chemical ideas have been developed, explained, and received.

Advanced Physics

This is an intensive, calculus-based course in classical physics. The course syllabus includes all topics in the Advanced Placement Physics C curriculum: forces, energy, momentum, rotational motion, electrostatics, and induction. If time permits, we will also discuss special relativity, wave behavior, and quantum mechanics.